When knowledge was power

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Summary

This thesis explores the role of formal knowledge systems in small scale oral cultures in both historic and archaeological contexts.

Part One looks at knowledge systems within historically recorded oral cultures. The link between power and the control of knowledge is established. The mechanisms by which a vast corpus of information is structured and stored are discussed, starting with the body of research on primary orality. The thesis then enters new ground by analyzing the material mnemonic devices used by documented oral cultures. The focus is on maintaining a vast corpus of pragmatic information: animal behaviour, plant properties, navigation, astronomy and calendrical data, genealogies, laws and trade agreements, resource rights along with information collected due to curiosity alone. Case studies explore these ideas for a mobile hunter-gatherer culture, the Australian Yolngu, and a sedentary agricultural group of cultures, the North American Pueblo.

Part Two applies the ideas developed in Part One to the archaeological record through a set of ten material indicators of the presence of a powerful knowledge elite. Three case studies are given, the hunter gatherer site of Poverty Point in the south-eastern United States Archaic context, the sedentary agricultural site of Chaco Canyon in the Ancestral Puebloan context, and the transitional Stonehenge / Durrington Walls complex in the British and Irish Neolithic context. In all cases it can be seen that the lens of primary orality offers new insights into the purpose of the monuments and associated decorated objects. In conclusion, it is clear that an analysis of the role of rational intellect, pragmatic knowledge and mnemonic technologies offers a radical new tool for analysis of monumental structures and decorated objects for small scale oral cultures, while also indicating that there is a great deal more work to do.

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Introduction

This thesis addresses a simple question. How do oral cultures maintain a vast store of pragmatic knowledge when they have no writing? It then goes on to ask: can the answer to this question offer a new insight into the purpose of ancient monuments such as Stonehenge, Poverty Point and Chaco Canyon?

There is a robust body of research on the way in which knowledge is stored in cultures that have no contact with writing. The most influential texts in this field are Jack Goody's *The domestication of the savage mind* (1977), Walter Ong's *Orality and literacy: the technologizing of the word* (2002 [1982]) and Ruth Finnegan's *Literacy and orality: studies in the technology of communication* (1988). These references all make the point that in order to memorise and recall vast tracts of narrative, oral cultures developed many 'tricks of the trade' – oral technologies to aid them, such as formulaic and stereotypical expression, standard themes, adding characterizing epithets to names, repetition, redundancy, praise and blame formats, with rhythm and rhyme and dance. Vivid characters in stories form a mythological corpus. Narratives encode the knowledge base of the culture.

From crocodiles to Stonehenge

In writing *Crocodile: evolution's greatest survivor* (Kelly 2006), I became aware of just how accurately the behaviour of the local species of crocodilian was recorded in oral tradition. Mythology served as a method by which details of animal identification and behaviour could be readily stored and retrieved. Oral tradition stores a vast amount of pragmatic scientific knowledge, but stores it in a manner totally alien to those with Western scientific training. Although the vast majority of writing on oral tradition refers almost exclusively to religion and history, a few researchers, such as Watson-Verran and Turnbull (1995) and Majnep, Bulmer and Healey (1977), address the issue of the natural sciences and the methods by which they are and were encoded in mythology. Journals on ethnoscience, such as *Archaeoastronomy: The Journal of Astronomy in Culture*, or books, such as Goddard, and Kalotas (2002) and Wyman and Bailey (1964), present the knowledge in the format of Western science, making brief reference to the way in which the knowledge was encoded in song or mythology.

All humans are inhibited by their unreliable memory. It would be naive to claim that indigenous people work any less hard at knowing than we do in Western society. Hence my question became: how do oral cultures retain so much information? In particular, how do they retain the pragmatic knowledge they need to survive as a society: how animals behave, what to eat and what to avoid at all costs, how to use plants for medicines and how to bind wounds,

how to avoid inbreeding, know who has rights to what land and which animals, where to find resources such as water in the desert, flint in the ground or moths at a distant mountain at a very specific time of year, how to navigate to gatherings and know when those gatherings will be, in order to set off in time?

It is well recorded that traditional cultures retain a complex classification of animals and plants–way beyond what is eaten (Goody 1977, p. 59; Majnep & Bulmer 1977, pp. 45-9; Fowler 1999, p. 419; Turnbull 2000, p. 150, Wyman & Bailey 1964). They need to: tangle with the wrong invertebrate or eat the wrong fungus and it can be fatal. The stars are used for navigation and time-keeping, as well as metaphor for mythology that talks of ethics and moral behaviour. There are lessons from the past to provide knowledge for the future, especially about how to survive in times of extreme resource stress. So how do the knowledge keepers within traditional cultures remember so much information without writing?

All oral cultures explored—from the mobile Australian Aboriginal cultures to the sedentary Pueblo farmers, the African Luba and Yoruba, the New Zealand Maori and the Melanesian seafarers—every culture I explored used formal teaching methods to instil the songs, stories and dances as the young reach higher and higher levels of initiation into the culture. But the oral technologies, so thoroughly documented in the research on primary orality, were still not enough.

It was from talking to Australian Aboriginal people that I recognised that at every level of initiation into knowledge, there were material memory aids involved. From hand-held inscribed objects to art on bark and rock, to the landscape itself—all linked to ‘The Dreaming’, or, as many of the indigenous Australians I spoke to prefer, ‘The Law’ or ‘The Knowledge’. Searching further, I found that oral cultures all over the world use a vast array of physical mnemonic devices—some representational and others abstract, some public and others highly restricted. Secrecy served to ensure that the knowledge remained unadulterated. In every culture I studied, the dichotomy between public and restricted knowledge was enshrined in traditional law.

The pattern which emerged, as will be described in Part One of this thesis, served to optimise memory of the knowledge gained over hundreds, if not thousands, of years.

When standing at Stonehenge, staring at the immense stones that the Neolithic British oral culture had erected five thousand years ago, I could see how perfectly they had constructed a knowledge theatre that changed over the millennia in tune with emerging social complexity. Yet I could find no reference to the research on primary orality in the archaeological literature on the British Neolithic.

It seemed that the role of artificial knowledge systems had rarely been alluded to in the archaeological debate. The more I read on Neolithic Britain, the more I could see physical

mnemonic structures. The more I read on world archaeology of monumental sites created in the early stages of settlement, the more my theory of the mnemonic device seemed to answer key questions about the reasons why ceremonial spaces were laid out the way they were, and the purpose of enigmatic objects associated with them.

Primary orality

Oral cultures exhibit a dichotomy in speech patterns, between everyday speech and formal narrative. The latter employs the standardised procedures mentioned above, which are referred to as 'oral technology' or 'orality' (Couch 1989, p. 589; 1996, p. 7). 'Primary orality' is an information technology, a tool that increases the ability of humans to process information and so increase the amount and complexity of information preserved in cultures with no access to writing. In the past, societies that developed effective information technologies had a better chance of survival than those that did not (Ong 2002 [1982]; Couch & Chen 1988; Couch 1996). Although there are vigorous debates about the ways in which literacy impacts on thinking, there is a very high level of agreement among writers in the field of primary orality about the way in which oral technologies are used to enhance memory. It is this area of agreement which forms the basis of the ideas developed in Part One of this thesis. Knowledge which is no longer being repeated, no longer being deliberately and actively remembered, is lost.

Oral tradition is usually represented as collections of child-like myths or as oral history[1]. In a text for archaeology students, Renfrew and Bahn[2] include a section headed 'oral tradition' which states:

> In non-literate societies, valuable information about the past, even the remote past, is often enshrined in oral tradition – poems or hymns or sayings handed on from generation to generation by word of mouth. This can be of quite remarkable antiquity. A good example is offered by the hymns of the *Rigveda*, the earliest Indian religious texts, in an archaic form of the language, which were preserved orally for hundreds of years, before being set down by literate priests of the 1st millennium AD. Similarly, the epics about the Trojan War written down by Homer in about the 8th century BC may

[1] The vast majority of books on oral tradition tend to be either in a mythological genre, such as *Bunjil's Cave: myths, legends and superstitions of the Aborigines of South-East Australia* (Massola, 1968) or a historical genre such as *Uqalurait: an oral history of Nunavut*, (Bennet & Rowley, 2004). Also see *Oral tradition as history* (Vansina, 1985).

[2] Renfrew and Bahn (2008) has been chosen as the text to represent the current standard in archaeological definitions and scope. It is now in its 5th edition and used as a standard text in universities all over the world including LaTrobe University.

> have been preserved orally for several centuries before that time, and are thought by many scholars to preserve a picture of the Mycenaean world of the 12th or 13th century BC.
>
> Epics such as Homer's *Iliad* and *Odyssey* certainly offer remarkable insights into social organisation. But, as with so much oral tradition, the problem is actually to demonstrate to which period they refer – to judge how much is ancient and how much reflects a more recent world. Nevertheless, in Polynesia, in Africa, and in other areas that have only recently become literate, the natural first step in investigating social organisation of earlier centuries is to examine the oral traditions (2008, p. 190).

Goody (2010, p. 65) specifically rejects the *Rigveda* as typical of purely oral traditions. Couch (1989, p. 589) argues that scholars have given undue significance to epics (see for example Havelock 1986; Lord 1960, 1991). In fact, epics are not commonly found in purely oral traditions (Finnegan 1970; Vansina 1971, p. 450; Clunies Ross 1986, p. 262; Goody 2006; 2010). Archaeology students would need to explore the more recent material on cultures from areas such as Polynesia and Africa, and even more so, from Australasia, to gain an insight into the vast store of scientific information contained in the songs performed on formal occasions within a broad range of oral cultures.

Oral tradition encodes a body of knowledge based on real world observations and experience: knowledge of animal behaviour and plant properties, genealogies, geology, climate and seasons, geography, astronomy, how to run a calendar and how to control access to resources. Recognition of this fact in journals addressing the ethnosciences, such as ethnoastronomy and ethnozoology, is slowly having impact.[3] When indigenous sciences are acknowledged, oral tradition can be seen in a more complex and realistic light. Without a body of knowledge built up over many generations, without a structure to that knowledge, and without a method by which that knowledge is retained in memory, essential pragmatic information about the environment will be lost. Enmeshed with that information will be a complex array of cultural knowledge which is essential for a group of individuals to survive and flourish in relative harmony.

This thesis will show that small-scale traditional cultures store oral tradition in structured formats. The thesis will also explore the way in which mnemonic technologies, both oral and material, are used to enhance memory of this vast store of knowledge when there is no access to writing. This is a new way to view oral tradition—as a structured

[3] Journals such as *Archaeoastronomy: The Journal of Astronomy in Culture* and *The Journal of Ethnobiology and Ethnomedicine* recognise indigenous sciences, but this recognition is rarely acknowledged outside these academic communities.

information system with embedded mnemonic structures to optimise memory. It is this visualisation which grants insight into aspects of the archaeological record which have, to date, resisted interpretation.

Primary orality and the archaeological record

The cultures which built Stonehenge, Chaco Canyon and Poverty Point, among many other prehistoric monumental sites, were oral cultures. A great deal is known about the archaeology of these sites – their physical structures, changes over time and associated artefacts. Yet the understanding of primary orality had not been used previously in archaeological interpretation on these sites. Having discussed my ideas now with dozens of archaeologists, only two had engaged with any research on primary orality. It seems that the two fields, although both interpreting aspects of oral cultures, had not yet been used to inform each other.

Most physical anthropologists agree that modern humans have been essentially alike in behaviour and cognitive ability since the emergence of *Homo sapiens* somewhere between 100,000 and 40,000 years ago (Renfrew & Bahn 2008, p. 393), well beyond the time span of the cultures explored in this thesis. However, most discussions about ancient small-scale cultures depict them as groups of humans who eat, shelter, procreate, die and, at times, build monuments. There will usually be reference to 'rituals' and 'ceremonial', but these will be represented as serving no purpose other than 'primitive' superstition and social harmony[4]. The oral tradition of the society which built the monuments is presented as a much simplified version of contemporary oral cultures, while there is no reason to suppose the culture only 5000 years ago would have lacked the complex knowledge seen in contemporary hunter-gatherer and non-stratified sedentary cultures, such as the Australian Aboriginal and the American Pueblo, respectively.

In the book, *Archaeologies of Memory*, Alcock and Van Dyke (2003) explore the role of memory in archaeological interpretation through a number of chapters written by experts on major archaeological sites and enigmatic incised objects. Only one of these (Lillios 2003) makes any reference to primary orality. Lillios proposes that incised plaques may be mnemonic to genealogy. It is the lens of orality that offers new insight into the purpose of the

[4] For example, recent books by prominent archaeologists are typical: such as Darvill's *Stonehenge: the biography of a landscape* (2006), Bradley's *The prehistory of Britain and Ireland*, and Johnson's *Solving Stonehenge: the new key to an ancient enigma* (2008). All have thorough discussion of landscape, food eaten, tools and pottery, a great deal about burials and monuments along with suggestions of 'ritual', trade and gatherings at the solstices. There is no suggestion that any of these cultures may have had structured knowledge systems, nor that there would be any formal teaching of pragmatic knowledge.

monuments built by small-scale cultures in the early phase of settlement. In making this link, a new theory is also made possible for enigmatic decorated objects associated with the various sites.

In Part Two of this thesis, I argue that the role of knowledge systems is greatly underrepresented in the archaeological context. The power associated with control of knowledge is evident in most, if not all, oral cultures documented on contact or still extant. It is that power which gives the vital clue to who was running the organised, yet apparently egalitarian, cultures who built many of the world's most enigmatic monuments.

Mobile hunter-gatherer groups are usually represented simplistically, as by Renfrew and Bahn in *Archaeology: Theories, Methods and Practice*:

> **Mobile hunter-gather groups (sometimes called "bands").** These are small-scale societies of hunters and gatherers, generally of fewer than 100 people, who move seasonally to exploit wild (undomesticated) food resources. Most surviving hunter-gatherer groups today are of this kind, such as the Hadza of Tanzania or the San of southern Africa. Band members are generally kinsfolk, related by descent or marriage. Bands lack formal leaders, so there are no marked economic differences or disparities in status among their members (2008, p. 178).

The map accompanying the above quote indicates that the Australian Aboriginal cultures are included in this definition. Although I find this a reasonably accurate, generalised description, I cannot agree with the very last statement. In all Australian Aboriginal cultures there are disparities in status. Elders gain respect, status and access to restricted knowledge, sites and sacred objects through initiation.

The many stages of the Stonehenge complex of monuments, I will argue, materialises the change in knowledge structures from that reflecting a mobile hunter-gatherer band to that of a chiefdom. The role of knowledge should become a major component of the relatively new field of cognitive archaeology. Renfrew and Bahn (2008, pp. 391-428) describe cognitive archaeology as involving the way people thought, including how they described and measured their world, the weights used, planning of monuments and cities, maps, the material goods people valued most highly and symbols of authority or power. They also included the investigation of the way people conceived of the supernatural and responded to these beliefs.

Leading theorists in the field of cognitive archaeology, Flannery and Marcus write:

> Cognitive archaeology is the study of all those aspects of ancient culture that are the product of the human mind: the perception, description, and classification of the

> universe (cosmology); the nature of the supernatural (religion); the principles, philosophies, ethics, and values by which human societies are governed (ideology); the ways in which aspects of the world, the supernatural, or human values are conveyed in (iconography); and all other forms of human intellectual and symbolic behaviour that survive in the archaeological record (1996, p. 351).

Both references also note that human intelligence is employed in common subsistence-settlement behaviours such as hunting, fishing, farming, plant collecting, tool-making and so on, but that this does not fall under the definition of 'cognitive archaeology'. However, formal recording and teaching of oral tradition and the role of initiation into restricted knowledge, is not mentioned in these, nor any other archaeological texts or papers that I have read. Nor is there any discussion of structures or artefacts possibly being mnemonic to knowledge. There is often mention that such items may act as reminders, but I will argue that these were created and decorated to suit mnemonic teaching purposes for complex knowledge systems, not as simple reminders of past events.

In this thesis, I will illustrate how these understandings offer a new interpretation for the purpose of the monumental structures at the Mississippian mound-building site of Poverty Point and the Ancestral Puebloan site of Chaco Canyon. I will also demonstrate how this same approach may be applied to the megalithic monuments and associated decorated artefacts of the British and Irish Neolithic, in particular the Stonehenge/Durrington Walls complex of monuments. Each site is different. Each culture has its own way of implementing a knowledge system and leaving traces in the archaeological record. Kidder, Ortmann and Arco refer to the three specific sites named above as '*sui generis*' arguing that 'some sites are simply unique' (2008, p. 9). Although I agree that these sites are unique, I believe they can only be fully understood within the context of the smaller contemporaneous sites and the transitions evident before, during and immediately after their prime.

Although I feel confident to argue that the control of knowledge was the principal source of power in these ancient cultures, it is beyond the scope of this thesis to make claims about the content of the beliefs. Although I am able to make informed suggestions about the genres of knowledge stored, I cannot offer any details on the mythology or cosmology of these long lost cultures. I will argue that it is only the mnemonic structures and artefacts that are left in the archaeological record. The content of the knowledge system was stored in living memory, and with all human memory now long dead, that content can never be retrieved. Hence this thesis also serves as a grave warning. The imperative to store the knowledge of contemporary oral cultures is immediate. If we do not do so before literacy and colonialism destroy what is left, then the knowledge stored within these cultures will be lost forever.

An archaeology that takes account of the role of knowledge systems in prehistoric cultures, of how objects and spaces aided in the transmission and retention of important cultural knowledge, stands to produce compelling, and in many cases, radically new, understandings of prehistoric sites.

Knowledge is power

Or so it used to be. Australian Aboriginal cultures in their traditional state, American Indian cultures resisting the influence of the colonisers, African cultures still practicing their ancient knowledge systems—all provide ample examples of the way in which those who controlled the knowledge also controlled society. The role of knowledge in the exercise of power is underrepresented in archaeological interpretation of prehistoric social structures.

British Neolithic archaeologist, Mike Parker Pearson, wrote with Ramilisonina:

> We employ cross-cultural generalizations as a means of assessing the likelihood of certain aspects of social organization being shared between different cultural contexts. We may define these generalisations as probability analogies since they work on the principle that, if a certain relationship is found amongst most traditional societies today, then there is a probability that this relationship probably obtained in most societies in the past (1998, p. 309).

Archaeologists describe monument building eras, such as the British Neolithic, the Archaic of the American Southeast and the Ancestral Puebloan era of the American Southwest, as showing no signs of a wealthy elite, no physical signs of a hierarchy. Yet to build such monuments as Stonehenge, Poverty Point and Chaco Canyon, there must have been an organising hierarchy. I propose that, as in contemporary Australian Aboriginal hunter-gatherer cultures and Pueblo sedentary societies, the power given to Elders was based on their access to knowledge. Part One of this thesis develops the cross-cultural generalisations while Part Two then applies the relationships obtained to the archaeological context.

I acknowledge that, as Renfrew says, ‘Modern hunter-gatherer societies are the product of forty centuries of sapient evolution, just as much as urban ones. They should not be regarded as living representatives of the Palaeolithic past’ (1998, p.4). However knowledge, such as that of the of the formation of Port Philip Bay (Blake 1979, p. 34) discussed in Chapter One, date back to over double Renfrew’s ‘forty centuries’, well before Stonehenge was built. Methods found in contemporary Australian Aboriginal knowledge systems can be traced back for over 40,000 years (Haynes 2000, p. 53). Hence, it is considered justified to

propose that the generalisations about oral knowledge systems can be translated into prehistory, as archaeologists currently transfer generalisations about human physical attributes and needs. It would be highly speculative to transfer the beliefs of any contemporary culture into the prehistoric era. However, it is logical to consider that the technologies by which they formally taught and painstakingly memorised their knowledge might have analogies in the more distant past. This thesis argues that bringing a deeper appreciation of the demands of knowledge retention and transmission in oral cultures to archaeology opens up possibilities for radical reinterpretation of sites and artefacts, globally.

Bias towards the natural sciences

Flannery and Marcus argue that archaeologists can only work on issues such as cosmology, religion, ideology and iconography when there is sufficient background information available.

> ‘When almost no background knowledge is available, as for the aceramic Neolithic, such reconstruction can border on science fiction. That is when every figurine becomes a ‘fertility goddess’ and every misshapen boulder becomes a ‘cult stone’’(1996, pp. 360-1).

It is possible only to speculate about whether the people who constructed the monumental sites believed in a sun god, worshipped ancestors, sacrificed animals (or even each other), believed the stones had health-giving properties or entered into narcotic induced trances. However, it is possible to be fairly certain that they had detailed knowledge of the environment and food sources, communicated with each other, sang, danced, had sex, used a range of medicines, resolved disputes, abided (mostly) by social laws, punished those who transgressed the laws, had ideas about where the land, animals, plants and themselves came from—and were curious. What is universal is not the content of beliefs and rituals, ceremonies and rites, but the imperative to store knowledge in their oral tradition when they had no writing. Without this knowledge, they simply would not have survived.

In focusing on the pragmatic and scientific aspects of the knowledge of ritual and ceremonial, I am not in any way denying the spiritual component within the complex integrated nature of oral tradition. Spirituality is a topic dealt with far better by the many experts in the field.

Our differences – our histories and religions – are widely discussed in considering oral tradition. This thesis focuses on our commonalities – knowledge of fauna, flora, astronomy, geology, seasons, weather and closely linked disciplines such as navigation and maintaining a

calendar. Kangaroos bound and bees make honey whether observer is literate or nonliterate. It is the way in which these observations are remembered, utilised, interpreted, stored and conveyed, which depends very much on whether the culture is oral or literate, mobile or sedentary, small or large scale.

One reason for the failure of literate cultures to recognise non-literate knowledge systems results from the feeling of superiority of early colonists and their missionaries. The vast majority simply didn't attempt to understand traditional ways of representing knowledge. As Walter Ong writes, 'We – readers of books such as this – are so literate that it is very difficult for us to conceive of an oral universe of communication or thought except as a variant of a literate universe' (Ong 2002, p. 2). Until the last few decades, very few even tried.

In a detailed analysis of science in indigenous knowledge systems, Watson-Verran and Turnbull wrote that 'there is no great divide between the past and the present, between scientific and traditional knowledge' (1995, p. 119). Similarly, Finnegan (1988, pp. 61-6) argued that the role of literature in literate societies is found in the orality of non-literate cultures all over the world. It is reasonable to assume that prehistoric cultures capable of building Stonehenge, Poverty Point or Chaco Canyon, at most 6,000 years ago, had a complex knowledge system. Although the specific content of a given contemporary knowledge system cannot be transferred into a prehistoric past, cross-cultural generalisations of mnemonic methods may be invaluable in interpreting symbolic structures. Studying the role of those who maintained the knowledge in contemporary traditional cultures can indicate signs of similar roles in ancient cultures.

Methodology in exploring oral traditions

This thesis engages with anthropological studies and also with archaeology, history, a whole range of ethnosciences, information technology, communication theory and theories of education and memory. The research would not be possible from within the boundaries of a single discipline. When researching oral tradition, it is difficult to discriminate that which is sound in the view of the indigenous people themselves. It must also be acknowledged that oral cultures, like all societies, are in a constant state of change.

To see general patterns in indigenous knowledge systems, I needed to explore a broad range of oral traditions, and avoid becoming too immersed in a single set of beliefs and practices. I chose initially to read as broadly as I could on Australian Aboriginal cultures, as I already had a strong background in the native flora and fauna. I was keen, however, to ensure that my reading reflected the knowledge as closely as possible to indigenous understanding and so I relied on advice from indigenous sources from the outset. In particular, The Koorie Heritage Trust in Melbourne and the Ngarn-gi Bagora Indigenous Centre at La Trobe

University, acted as my guides in this matter.

There were a number of resources which I felt were valuable but which were rejected by indigenous advisors and so have not been included in this research. For example, *The teaching stones of the outcast tribe*, (Anonymous 1999) gave examples of stones which acted as mnemonic to story and were used for teaching. It was rejected by staff members at The Koorie Heritage Trust as being of suspicious authenticity. *Gwion Gwion: Dulwan Mamaa: secret and sacred pathways of the Ngarinyin Aboriginal People of Australia* (Doring 2000) gave me specific examples of songs linked to rock art. It was considered reputable by the Ngarn-gi Bagora Indigenous Centre but its authenticity was questioned by The Koorie Heritage Trust. Given the vast array of material available, I have limited myself to that which is recommended consistently by indigenous individuals and organisations, or appears in the bibliographies within those recommended titles.

For other cultures, such as African, Polynesian and Inuit, I sought references from indigenous writers or those who had worked closely enough with the cultures to learn the language and be initiated to some degree. Although I drew cross-cultural generalisations from as broad a scope of oral cultures as possible, it was necessary to understand how non-literate knowledge systems fit within the totality of a culture. To this end, two cultures were selected as case studies, enabling me to explore hypothetical ideas about the transition from mobile to sedentary lifestyles—the transition I had identified as being critical in the changes over time in the Stonehenge landscape.

Of Australia's many hundred hunter-gatherer language groups, the Yolngu of north-east Arnhem Land have worked with anthropologists and linguists to release a great deal of material into the public domain under their own terms. Living in a remote location, their culture was able to survive the onslaught of colonisation into an era when growing respect for indigenous people meant a slightly less devastating initial contact period.

Of the sedentary agricultural oral cultures, one of the best documented and most accessible were the American Indian cultures. Of these, it soon became clear that the Pueblo had best managed to stay on their own land through the shattering of Native American cultures by colonisation, and had also released information on their own terms, with Native Pueblo anthropologists such as Alfonso Ortiz (1969; 1972) and Tessie Naranjo (1995), offering an invaluable insight by writing from an Indian perspective for non-Indian readers. A complex of language groups, contemporary Pueblo were also linked to Ancestral sites.

For American Indian anthropology, I relied on recommendations from staff at the National Museum of the American Indian, Washington, and the Indian Pueblo Cultural Center, Albuquerque and by archaeologists such as Larry Baker and Dr William D. Lipe, who worked closely with various Indian language groups in the American southwest.

If the purpose of Neolithic monuments such as Stonehenge was as a knowledge centre in an emerging complex society, similar structures should be able to be identified in other cultures going through the same process. I soon found many enigmatic monumental structures which fell into the same early settlement stage. In no case could I find analysis of the role of formal knowledge systems in the theorised social structures.

Of many possibilities, I chose two secondary case studies. Poverty Point, Louisiana, consisted of monumental mounds constructed by a hunter-gatherer culture in the early phase of mound-building along the Mississippi River. At a more complex social scale, Chaco Canyon, New Mexico, was an early Ancestral Puebloan site in the American Southwest, representing a large, farming culture. The added advantage of Chaco Canyon was the link to contemporary Pueblo people.

The thesis structure

Part One of the thesis addresses the relationship between knowledge and power in non-literate cultures which will be used to support the claim that knowledge was the source of power in the 'egalitarian' British Neolithic, American Archaic and Ancestral Puebloan cultures. Although the role of religion and history are acknowledged as a significant aspect of oral tradition, it is the critical role of the use of plants and animals for pragmatic purposes and as conceptual metaphor that is explored in this thesis, along with methods for storing information about genealogies, navigation and time-keeping. As control of the ceremonial and agricultural calendar is a powerful role within most, if not all, traditional cultures, astronomical knowledge is seen as a key indicator of a knowledge elite. Astronomy is also explored as used as an aid for navigation and metaphor for myth.

Viewing oral tradition as a structured information system is an original way to conceive non-literate knowledge systems. The link made between primary orality and the material mnemonic technologies offers an invaluable segue into the archaeological record.

Part Two offers a generalised set of oral and mnemonic technologies to be applied in the archaeological context. Applied here to three small-scale sedentary cultures, this theoretical framework offers a new tool with which to explore many enigmatic monuments and associated artefacts. The first example of how this theoretical framework might be applied is the sedentary agricultural culture centred on Chaco Canyon, and the associated outlier communities. Although contemporary Puebloan cultures cannot be transported back into prehistory, they can offer insight into the purpose of ritual and ceremonial behaviour in their ancestral sites. Enigmatic aspects of Chacoan material remains appear to fit well with the concept of Chaco Canyon as a knowledge centre. The framework is then applied to the mound-building Mississippian cultures, in particular the hunter-gatherer site of Poverty Point,

Louisiana, offering a radically new interpretation of the purpose of the mounds and some of the associated artefacts.

Applying this framework to the British and Irish Neolithic, I offer a radically new interpretation for the purpose of these monuments and some of the associated artefacts, and the socio-political structure of the cultures who built them. The Stonehenge complex of monuments is examined in detail. The currently circulating theories for the purpose of Stonehenge include an astronomical observatory, a site for healing and a cemetery. These become epiphenomena when the Stonehenge monument complex is explored as a memory theatre for the transition to a sedentary farming community in which the oral specialists become an ever more restrictive social elite.

Through a theoretical framework for the interpretation of ceremonial sites and decorated objects, this thesis offers archaeologists a new tool with which to examine old problems.

The scope of this thesis

As a result of this research, so many new areas of research opened up that it was impossible to include more than a portion of the outcomes in this thesis. Regrettably, a detailed study of mnemonic technologies associated with primary orality was beyond the scope of this thesis. Only brief reference is made to the orality/literacy divide which is becoming an ever-more blurry line. The impact on art, in particular, is well worth a detailed study. A superficial investigation at museums and art galleries indicated that art styles changed as literacy developed, reflecting the reduction in the role of art as mnemonic to knowledge along with an increase in what appeared to be purely aesthetic properties. A brief overview of the way in which the theoretical framework might offer new insights into a range of other archaeological sites, such as Easter Island and the Nasca Lines, is offered in the final chapter, but it was not possible to do more than a superficial exploration.

What is not covered in this thesis is the way to extract the actual beliefs and knowledge encoded in the mnemonic structures discussed. At this stage, I do not believe that the content of ancient oral knowledge systems can ever be discovered. The knowledge existed only in living memory. However I do believe that some indication can be found when the archaeological record is explored through the lens of primary orality. For example, the distribution of formal deposits in ceremonial sites may be able to be linked to a ceremonial cycle, indicating what type of knowledge may have been of consequence during particular rituals and ceremonies at particular times of the year. At this stage, I don’t believe this kind of analysis could be anything more than highly speculative. I would be delighted to be proven wrong.

It is only through the academic debate, and the application of the ideas presented in this

thesis by others, that the value of the insights offered here can be fully realised.

PART ONE

Chapter One – The power of knowledge in oral cultures

Introduction

'Education of initiates continued throughout life, for knowledge meant power, responsibility and regular ceremonial duties' (Flood 2006, p. 151).

Cross-cultural ethnographic evidence is unequivocal: in small-scale oral cultures, control of knowledge is the major source of power. When there is no sign of individual wealth or social control by force, I will argue that the elite in small-scale oral cultures maintain power through the control of knowledge. In Part Two, I will argue that it is a knowledge elite who were responsible for the construction of Neolithic and Archaic monuments.

Everybody learns, all day every day. We observe and gain new knowledge constantly. That sort of informal knowledge is not what this thesis is about. Some knowledge has to be learned formally, consciously studied in order to be remembered. Literate cultures record that knowledge on paper, in books or on disc. Without writing, however, the knowledge of the culture must be committed to memory; practised, repeated and stored for future use in fragile, unreliable human memory. It is the way formal knowledge is stored in oral cultures which is the basis of this thesis.

Knowledge in oral cultures

It is now well accepted that oral cultures are not the 'miserable savages' depicted so widely only a century ago. In 1913, for example, Sigmund Freud wrote: 'I shall select as the basis of this comparison the tribes which have been described by anthropologists as the most backward and miserable of savages, the aborigines of Australia' (Freud 1960, pp. 1-2). I shall also select those tribes, but when described by better informed anthropologists, the complexity of the knowledge systems of the Aborigines of Australia is undeniable.

However, even in the most culturally sensitive media organisations, indigenous knowledge is unintentionally ignored. The recent Australian Broadcasting Commission film, *Australia: land of parrots,* included the following comments:

> Few people have ever seen this bird. The palm cockatoo dates back tens of millions of years to when Australia was covered in rain forest; he's the granddaddy of them all. Little was known of this mysterious bird until Steve Murphy began his study' (Parer & Parer-Cook 2008).

The ‘few people’ include thousands of years of Mungkan, Kaanju and Ayapathu occupation. ‘The palm cockatoo is a significant totem animal for many local Aboriginal people’ (Queensland Government 2010).

This thesis assumes that the individuals within oral cultures have the same range of intellectual potential, physiology and memory ability that is typical of all humans for at least the last few millennia. We need to look beyond superficial differences to understand our deep similarities. It is only when the complexity of oral tradition is acknowledged that the control of knowledge can be seen as a tool for power.

Goody (1987, p. 156-7) argues that there are effectively three modes of acquiring knowledge, which he feels are widespread in oral societies. Firstly, basic knowledge is acquired in daily interaction, which is the way in which the bulk of the culture, the sum total of learned behaviour, is acquired. Secondly, a specialised form of knowledge is transmitted in bounded situations, which comes largely from participation in ceremonies and discussion with elders. Thirdly, there is the knowledge that comes direct from the spiritual beings. It is the second and third categories which are addressed in this thesis. As Goody acknowledges, these are so closely entwined as to make separation artificial.

The following overview of the types of knowledge which are formally stored in oral tradition will first consider the two areas most often addressed in anthropological studies: history and religion. The aspects which are more closely related to the theme of this thesis follow: the pragmatic knowledge, including the natural sciences.

Defining oral tradition

It is important to state what oral tradition is not. It is not teaching how to hunt or how to gather during daily excursions. It is not about stories casually told around the campfire at night–these are more folktale than myth, and are usually for children (Goody 2010, p. 8). Oral tradition is about formal knowledge, about the way oral cultures store, maintain and transmit knowledge which is central to their physical and social worlds. Throughout this thesis, I will be using the term ‘oral tradition’ as defined by Ruben (1995, p. 8).

Oral traditions

- Are universal; that is, they appear in all present cultures and past cultures that have been studied.
- Are fixed only within the accuracy of human memory.
- Exist in genres; that is, they appear in restricted, coherent forms.

- Are transmitted in a special social situation, such as a performance or a ritual.
- Are entertaining by modern literate standards, but this is not always the primary traditional function.
- Are considered as special speech, either art or ritual.
- Transmit useful cultural information or increase group cohesion.
- Are poetic, using rhyme, alliteration, assonance, or some repetition of sound pattern.
- Are rhythmic.
- Are sung.
- Are narratives.
- Are high in imagery, both spatial and descriptive.

Oral tradition as history

Oral tradition is often equated with oral history (see for example, Attwood & Magowan 2003, p. xii-xvii). Fentress and Wickham consider the difference between 'oral tradition' and 'oral history' to be 'relatively unimportant' as both, they consider, involve recounting past events (1992, p. xii). This blurring of definitions can lead to scholars neglecting the vast store of scientific information, which is constantly reinforced or enhanced by experience. 'Oral tradition' is defined by Jan Vansina as 'testimonies of the past which are deliberately passed from mouth to mouth' dating from beyond the lifetime of the informants (1960, p. 43;1985, p. 13). However, oral tradition reflects all aspects of current social life, all expressions of the culture, with intentional historic accounts yielding only a small proportion of the entire corpus. The history recorded tends to be only that which is still relevant to the needs of the society at that point in time (Vansina 1985, pp. 119-20) and is not so much an accurate chronological history in the literate sense, tending to reflect concrete social requirements more than abstract historical ones (Henige 1974). Elements of historical record which cease to have current relevance are forgotten (Goody & Watt 1963). Consequently, oral tradition is constantly changing as new information is added and information which is no longer of great importance is lost.

Wiessner notes that the Enga of Papua New Guinea distinguish clearly between myth and historical traditions, the latter containing 'information on subsistence, wars, migrations, agriculture, the development of cults and ceremonial exchange networks, leadership, trade, environmental disasters, and fashions in song and dress' (2002, p. 237). Knowledge of the natural sciences is often encoded within mythology as will be discussed in Chapter Two.

American Indian writer, Donald Fixico, describes oral tradition as involving 'oratory,

myths, legends, songs, parables, and prophecy' while oral history is the 'non-Indian interpretation and understanding of native oral tradition' (Fixico 2003, p. 34). It is generally accepted that oral tradition is unreliable as chronological history (Vansina 1985). This does not mean that long-term memory is not possible. It just means that oral tradition stores information that is of more value to the culture than a chronology of events. Aboriginal Australians, for example, appear to be remarkably ahistorical in outlook, while some Maori can recite an 800-year genealogy from when their ancestors reached New Zealand (Flood 2006, p. 140).

Myth in oral cultures is often interpreted as purely fanciful stories, ignoring its role as a complex mnemonic technology, as will be discussed in detail in Chapter Two. The eminent British pre-historian, Richard Bradley, for example, argues that studies of oral history reveal that cultures do not tend to remember events over much more than two generations and that memories 'become increasingly inaccurate until they are so corrupt that they can hardly be distinguished from myth' (2003, p. 221). Researchers working with oral traditions have shown the accurate retention can certainly extend more than Bradley's 'two generations', but that the accuracy depends on political needs, not historical ones. Australian anthropologist, John Bradley argues that history, as it is captured by the Australian Yanyuwa people

> is not the chronologically ordered, linear, teleological sense of time suggested by the term 'history', although Yanyuwa know time-lines by articulating relationships to both deceased and living kin. As people move through certain events, their significance becomes etched into memory according to associations with country, which Yanyuwa have constantly sought to maintain. These memories create sediments of narrative and song that are not fixed strata, but constantly shifting as information is recalled and used. Knowledge, then, of kin, country and kujika are in perpetual negotiation (Bradley 2010, p. 86-7).

Examining research from Australia, New Guinea and Africa, Australian rock art expert, Iain Davidson argues that 'although material signs such as rock art may act as mnemonics, it is extremely unlikely that accurate information is retained in oral histories for more than a couple of hundred years' (2010a, p. 388). Vansina writes that where 'social structure required the use of long genealogies, as among the Fang of Gabon and Cameroun where one remembered sometimes up to 30 generations in depth, events of several centuries back could still be given a place in time' (1985, p. 117). Well documented are the praise songs of African cultures, sung in honour of political rulers. These serve as a repository of associated historical and political knowledge. Inca praise-narratives devised by the Inca's descendants, report an

idealised version of historical events. They serve as political propaganda creating a religious and historical reality to achieve a political purpose (Niles 1999, p. 27).

Unlike historical data, much pragmatic information, such as knowledge of the environment, plants, animals, astronomy, navigation, laws and ethical expectations, is constantly being reinforced through experience and updated through new knowledge.

Pan-generational storage of pragmatic information

There is robust evidence that pragmatic information can be retained accurately over long time spans. Knowledge from many generations past is critical to the survival of social groups facing rare and extreme resource stress. Hunter-gatherers, such as the Nunamiut and Tareumiut of Northwest Alaska, experience wide seasonal fluctuations in the availability of resources. Significant are the unpredictable annual variations in the migration patterns of their most important game animals, the caribou and the whale (Johnson & Earle 2000, p. 172). Potential crises occur every ten to twenty years for the Nunamiut and as often as one in five years for the Tareumiut (Minc 1986), but these crises take many different forms requiring knowledge from many generations past. While belonging to the same cultural and linguistic group, the Tareumiut depend on cooperative whale hunting while the inland Nunamiut are typical family-level foragers, aggregating only for semi-annual caribou drives or sometimes settling in a group for security in winter. Ceremonies, such as the elaborate Tareumiut Messenger Feast, secure intervillage relationships while facilitating distribution of surpluses throughout the coast as well as inland (Johnson & Earle 2000, pp. 177-8).

Minc (1986) explores the role of ‘secular’ and ‘sanctified’ oral tradition in encoding information about how to deal with resource crisis situations for the Nunamiut and Tareumiut. She concludes that the secular forms of song-poetry include the transmission of specific values or behaviours relating to group survival across seasonal or short-term shortages. In order to retain a body of reference knowledge on the much longer pan-generational timescale, ritual performances were employed. From this sacred knowledge, rational decisions were made between alternative choices. Minc lists thirty recurrent themes which reflect critical survival strategies. These include complex relationships with critical trading partners, storage methods, the pooling of labour, utilising kinship ties, setting community responsibilities, treating strangers with suspicion, using secondary resources, intercommunity marriage and feasts, exploring resource potentials of other habitats, and moving into other habitats. Strategies also included marriage with those from different habitats, inter-habitat trade and feasts and learning to hunt unfamiliar resources via the skills learnt through that social contact. There are also oral tradition references to past hardships, seasonality, famines, starvation, death, as well as climatic change and its impact on resources.

Similarly, subsistence stress is an explicit theme in twenty-eight Klamath and Modoc myths from North America, and is also recorded for other societies (Sobel & Bettles 2000). In discussing the famine myths of the Tsimshian, of British Columbia, and Kagruru, of Eastern Tanzania, Cove (1978) notes that oral tradition is the ideal way to store and transmit survival knowledge, particularly for infrequently occurring stresses for which the information would otherwise be lost. He argues that 'it is difficult to overestimate the importance of trans-generational continuity encapsulated by mythology' (Cove 1978, p. 231).

Oral tradition over millennia

Accurate chronologies may not be possible for more than a few hundred years, but Australian indigenous cultures offer examples which appear to record events from thousands of years ago. The geography of tribal land is accurately recorded in oral tradition for many reasons, including agreements between neighbouring tribes, rights to resources, navigation and, as will be explained in Chapter Three, because landscape features are integral to the mnemonic structure of the knowledge system.

Australia's Tasmanian Aboriginal population was isolated from the mainland at the end of the last ice age. Analysing the archaeological record, Flood concluded that the

> basic belief system of Aboriginal Australia known as the Dreaming[5] clearly existed long before Tasmania was isolated. This shows that the Dreaming is of ice age antiquity, not a mere 1500 years as has recently been claimed (2006, p. 70).

Analysing possible causes for food taboos, Flood (2006, p. 72) asks: 'Could oral tradition sustaining taboos survive three millennia?' She quotes number of examples to indicate that it is highly likely that it does.

The Dyirbal language group has been in the same area for at least 10,000 years (Dixon 1972). Dixon writes that 'beneath the veneer of fantasies some myths may provide accurate histories of events in the distant past of the people. There is, for instance, a Ngadyan myth that explains the origin of the three volcanic crater lakes Yidyam (Lake Eacham), Barany (Lake Barrine) and Ngimun (Lake Euramoo)'. The myth includes what Dixon describes as 'a plausible description of a volcanic eruption'. The Dyirbal storyteller, in 1964, remarked that when this happened the country around the lakes was 'not jungle – just open scrub'. Scientists were surprised, less than a decade later, to find that the rain forest in that area is only about

[5] 'The Dreaming' or 'Dreamtime' is a non-Aboriginal term for Australian Aboriginal belief system, dating back to early anthropological writings. For details of the origin of the term, see Wolfe (1991). For an explanation of The Dreaming as 'a way of talking, of seeing, of knowing…' see Benterrak, Muecke and Roe (1984, p. 14).

7600 years old. The formation of the three volcanic lakes took place at least 10,000 years ago (Dixon 1972, p. 29). Dixon goes on to note that this indicates that knowledge of the volcanic eruptions and changes in the rain forest have 'been handed down from generation to generation for something like 10 millennia' (1972, p. 29). Dixon cites further evidence of the longevity of oral tradition from the myth Girugar, a legendary man who came from the south, visiting each mountain, lake and island and giving it a name. The storyteller remarked that in Girugar's day it was possible to walk across to Palm, Hinchinbrook and other islands. Geographers now believe that the sea level was sufficiently low for it to have been possible to walk to these islands at the end of the last ice age.

Land formations, now beneath Port Philip Bay in South-eastern Australia, were flooded at the end of the last Ice Age, 10,000 years ago. The flooding and the former river path were recorded in the songs and stories of the creation ancestor, Bunjil, the wedge-tailed eagle of the Boonwurung and Kurnai people. This knowledge was documented by the Select Committee of the Legislative Council in 1858. These landforms were only documented by Western scientists early in the twentieth century (Blake 1979, p. 34). Although the 10,000 year old date has been recently questioned as the bay may have dried significantly as recently as 1,000 years ago (Holdgate et al. 2011), longevity of oral tradition is still indicated.

Linguistic studies (for example, Dixon 1972) show that tribes are not insular entities and language is constantly changing due to interaction with other tribes and new knowledge. He argues that a continuum of oral tradition over 10,000 years does not imply a stagnant culture over the same period. What is demonstrated, however, is that some aspects of knowledge are so highly valued that they can be reliably retained over millennia.

Although an accurate chronology of events is not recorded over long time spans, it is evident that the formal recording of knowledge, such as that relating to landforms, resource rights and genealogies over long time spans are held in oral traditions on a broad scale.

Oral tradition as religion

> Religion… entails a framework of beliefs, and these relate to supernatural or superhuman beings or forces that go beyond or transcend the everyday material world. In other words superhuman beings are conceptualized by humans, and have a place in the shared cognitive map of the world (Renfrew & Bahn 2008, p. 412).

It is well beyond the scope of this thesis to define and discuss religion in all its variations. Clearly, spiritual beliefs are woven throughout oral traditions. Obviously, actual beliefs are culture specific. However, certain generalisations can be made. In a broad,

geographically diverse range of non-literate cultures, stories are told of spiritual beings who had a major role in the origins of the land, plants, animals and people. Commonly these beings have animal or human form, or a combination of the two. Humans are often seen as part of the animal world, sometimes even taking on the identity of totemic species. Natural forms, which Western culture describes as inanimate, such as rocks and mountains, are often included as life forms.

This thesis is dependent on reports from early contact with indigenous cultures. Many writers of these reports, if not actually missionaries, were from a devout Christian ethic. In his huge collection of Central Australian Aboriginal songs, T.G.H. Strehlow writes that ‘it is a striking characteristic that there are no invocations or prayers to the spirits or to the totemic ancestors contained in these songs’ (1971, p. 284). Sir James Frazer makes a similar point,

> it is a serious, though apparently a common, mistake to speak of a totem as a god and to say that is worshipped by the clan. In pure totemism, such as we find it among the Australian aborigines, the totem is never a god and is never worshipped (1968, p. 5).

In reading contemporary indigenous writing (for example, see Briggs 2008; Buku-Larrngay 1999; Perrurle Dobson 2007), or in videos made by indigenous Australians (for example see Aboriginal Nations Australia 2004; Cameron 1993; Graham 2006), the words 'gods' or 'worship' are not used. The talk is of 'Ancestral Beings' or 'Spiritual Beings' whose stories they tell. Nungarrayi emphasised that ‘the Dreaming’ is better translated as ‘the law’ and ‘the knowledge’ and is not merely simplistic stories about religious beliefs as so often portrayed (pers. comm. September 2009).

Although it is acknowledged that personal biases and background cannot be eliminated when trying to understand a different belief system, they can be minimised. By seeking analogies in the ethnographer’s own belief system, the ethnographer distances him or herself from looking more deeply at the purpose of ceremonies and supernatural beliefs, reducing them to primitive versions of what contemporary religious individuals might consider their own superior belief system. In this thesis, the terms which derive from analogies with Western cultures, words such as ‘gods’, ‘priest’, ‘prayer’, ‘worship’, will be avoided. Cultural beliefs will be represented, as much as possible, in the terms used by the indigenous people in question.

Oral tradition and pragmatic knowledge

Historical and religious knowledge can be modified to meet the politico-social needs of a society at any time. Pragmatic knowledge, in particular knowledge of the natural sciences

and environment, cannot be adapted at the will of the knowledge brokers. It can be updated and revised with new knowledge, but the constant audit against reality forces a consistency with the environment observed. Survival, particularly in times of resource stress, depends on this consistency.

Oral traditions constantly refer to actual landscape forms, the behaviour of a wide variety of animals and the properties of a huge variety of plants. Lists of properties are extremely difficult to remember without writing (Goody 1977; Ong 2002, p. 99). In fact, Abram argues that

> Without writing, knowledge of the diverse properties of particular animals, plants, and places can be preserved only by being woven into *stories*, into vital tales with specific characteristics of the plant made evident through a narrated series of events and interactions (1997, p. 120).

One of the most respected writers on oral tradition, Ruth Finnegan (1988), claims that the knowledge stored within indigenous oral tradition includes the laws of gender roles, expectations of conduct, rules for trade, how to bind wounds, the use of medicinal plants and animal products, dealing with dying and death, menstruation, sex, birth, aging, rites of passage, genealogy, observations of the seasons, the sun, the planets and the stars, religion, spiritual beliefs and origin stories among many other themes.

All oral cultures abide by some form of legal system and moral code, stored within their oral tradition. Among many aspects of the law is the need for different clans and tribes to regulate who has access to particular resources—in Western terms, who owns the land. In 2000, during the land claim on Kangaroo Island, Yanyuwa people sang their *kujika*, their sung narrative of the cartography and knowledge associated with it. This public singing in the land-claim court served to demonstrate their knowledge and love of country and their link to ancestors (Bradley 2010, p. 176). It is by owning the *kujika* that the local clan lays claim to the land, although in Australian Aboriginal terms, the land owns them and they are the custodians.

Knowledge of the indigenous animals and plants is clearly critical to the survival of hunter-gatherer peoples, and will be explored more fully in Chapter Four. My natural history research, specifically of crocodiles (Kelly 2006) and spiders (Kelly 2009), indicates that indigenous stories reflect a very detailed observation of the physiology and behaviour of the specific species which are eaten, avoided or simply observed. Although other aspects of the culture will change with time, the behaviour of animals and properties of plants observed thousands of years ago will still be fundamentally the same as today and offer a valuable tool

to explore different understandings of the same information.

The indispensability of pragmatic knowledge is clear in the case of hunting, which is not a matter of simply going out and spearing a few large mammals. Hunting, fishing or gathering animals for food is too inefficient without the detailed knowledge of the specific, often seasonal, behaviour of the animal. It is also essential to know those to avoid as well as those to eat. As will be shown in Chapter Four, the number of animal species named by a given indigenous culture numbers in the hundreds, if not more. Many animals are observed as indicators of environmental events, while most are used for some form of conceptual metaphor for human behaviour or understanding of a broader cosmology.

Plants are used far more than just for food. Many are poisonous and need to be avoided or require complex treatment before eating, such as cycad seeds, used to feed large gatherings in Arnhem Land (Bradley 2010, pp. 63-4; Flood 2004, pp. 237-40). Some plants are used for medical reasons, others to provide material needs. Of the hundreds of local species, each needs to be identified, collected at the right time in its growing cycle, and treated according to use. Hundreds of species are identified in any locale, with all the associated knowledge retained. It is not only necessary to know those that provide material needs, but also all those which have been tried and found wanting—the vast majority. Repeated testing of unsuitable plants would be an unworkable waste of time. Classifications by non-literate cultures have long been recognised as scientific in the Western sense of the word (Durkheim & Mauss 1970). Mobile hunter-gatherer plant and animal classifications normally recognise four to six levels within the taxonomy with even greater depth in subsistence farming groups (Fowler 1999, p. 419). Sedentary non-literate cultures also classify extensively, such as the bird classification of the New Guinea Kalam Country (Majnep & Bulmer 1977, pp. 45-9), the Dogon classification of about 300 vegetables (Goody 1977, p. 59) and the Pacific navigators detailed fish taxonomy (Turnbull 2000, p. 150). The Navajo classify over 700 insects, with names, sounds, behaviour and habitats encoded in myths, songs and dry paintings (Wyman & Bailey 1964). Again, it is simply impossible for any culture to retain all this knowledge without some formal structure.

Subsistence farming is not simply planting out seeds and adding water. Richard Ford analysed the many varieties of corn maintained by the Pueblo in New Mexico's harsh and unpredictable climate (Ford 1980). Ford showed how seed selection and storage necessary to retain the many pure strains was dependent on the knowledge stored in ceremony and song, reproduced through ritual practices of the clan elite, which will be explored in detail in Chapter Seven.

Pragmatism is not only a matter of eating. As individuals move across their land or sea territories, they need to navigate. Terrestrial and astronomical knowledge is employed to

aid navigation, but also to enable elders to maintain a calendar to optimise hunting and gathering, or planting and animal husbandry. The calendar is also essential to maintain the ceremonial cycle so closely interwoven with knowledge maintenance and transfer. It is also essential that small-scale communities avoid inbreeding. Laws on marriage, as well as extensive genealogies, are recorded formally by oral cultures across the world. The depth and complexity of astronomical, navigational, calendrical and genealogical knowledge will be dealt with in Chapter Five.

The pragmatic knowledge of interest to this thesis is often stored within practices which are reported in ethnographic and popular reports as spiritual or divinatory. Chadwick (1942, pp. 29-32) presents evidence of a variety of the 'seer', 'oracles', 'shaman' and 'shamaness' chants, recorded in Africa by earlier ethnographers, are linked to observations of wild animals, weather phenomena, observations of the sun and moon, earth, the rocks, soil, rivers along with narrations of hunting, military expeditions and historical information. This knowledge 'is given to scholars at the initiation ceremonies. The instruction is largely carried on in the form of question and answer' in 'African oral academies' (Chadwick 1942, p. 31). Chadwick also describes ritual in terms of knowledge systems within the Pacific and the way history and science are taught in what she referred to as a 'mobilised seasonal school' (Chadwick 1942, p. 87).

All human cultures are built up of individuals with a range of emotions and problems. Knowledge of how to deal with mental health issues is also stored in the tradition. McClelland describes the African Yoruba:

> There are the problems of emotional instability, periods of uncontrollable rage and its dire consequences, and many other signs of impaired mental health. Cares and doubts are centred on emotional reactions, lack of prestige, fear of failure, greed, envy, suspicions of neighbours, belief in the hidden malice of those in authority, loss of family, loneliness, poverty in old age and untimely death. They have a familiar ring (1982, p. 114).

Groups of humans will fight, whether physically or intellectually, over resources and relationships. Dispute resolution takes a prescribed, often ceremonial, form in virtually every oral culture, usually involving skill of the specialist orators who act on behalf of others needing their skills (Feldman 1991). Formalized events for the maintenance of social harmony are very widespread in oral cultures (Finnegan 1988, pp. 52-4; Keary 1996, p. 255; Urban 1986). The performance of Eskimo taunting songs, for example, involves two hostile singers who work off grudges and disputes through the performance of songs which ridicule

their opponents, victory being awarded to the most loudly applauded (Finnegan 1977, p. 157).

Non-literate knowledge systems are integrated. Knowledge of the plants and animals, landforms and weather, often serve to provide metaphor for discussion of human behaviour, ethics, expectations and social interactions. Probably the greatest store of knowledge is in the stories which talk about observations in the natural world and relate these back to laws for behaviour in the society. Despite Freud's lack of expectation 'that the sexual life of these poor, naked cannibals would be moral in our sense' (Freud 1960, p. 2), moral issues dominate the hundreds of indigenous stories read during research for this thesis.

Western culture has only recently come to recognise the depth and formality of indigenous knowledge. Havelock (1978, p. 335) argued that the control of culture lies in information that is accumulated and recalled, which is rendered in a language specifically used for this purpose. That role is so important that it offers great power to those who hold it.

When knowledge is power – the knowledge elite

The ethnographic evidence is consistent across a broad range of unconnected non-literate societies: oral specialists in small-scale cultures maintain power through the control of knowledge. Powerful individuals are often identified as those who have the most material wealth, yet in small-scale oral cultures, there is often no sign of individual wealth. Cultures with no apparent stratification are designated as 'egalitarian'. They may be egalitarian in terms of material possessions, but they are not egalitarian when it comes to knowledge. There are no true egalitarian societies, nor are there any simple societies—there are only societies which have egalitarian aspects to them (Flanagan 1989, pp. 261-2; Wiessner 2002, p. 234).

We need to look beyond material wealth for signs of power. Societies are organised according to the access to information as well as the more familiar access to matter and energy (Moore 1983; Root 1983). Flannery and Marcus argue that:

> Egalitarian societies do not simply remain egalitarian because they are poor, marginal, or underdeveloped; most have 'levelling mechanisms' that work to prevent the emergence of rank. Such societies may have numerous *acquired* differences in status, but their egalitarian ideology counteract any tendency to such status difference to become *hereditary*, or 'institutionalized (1996, p. 355).

Many terms are used for those who have access to knowledge which is not available to the entire population. This thesis will adopt the term 'knowledge elite' as it is a relatively neutral term with no further connotations. The knowledge elite serve a similar purpose in cultures throughout the world, but the specifics of the role are unique to each culture.

Power in the hands of oral specialists is recorded for mobile hunter-gatherer cultures including Australian cultures (Morphy 1991) where ceremonial leaders, often referred to as 'clever men', have great prestige in their community through control of knowledge (Clunies Ross 1986, p. 238). Similar roles are performed by the *n/om k"ausi* of the !Kung San and the *!gi:ten* of the /Xam of Southern Africa (Lewis-Williams 2001), the *noajdde* of Scandinavia (Bradley 2000), the *towoski* of Trobriand Islands (Bradley 2005). Hayden and Vileneuvre talk about the political power and esoteric knowledge associated with secret societies among North American hunter-gatherers, including the Chumash, Pomo, Northwest Coast and Interior cultures (2011, p. 346).

As a society grows and settles, an increasingly restricted knowledge elite emerges (Couch 1989, p. 593-4) such as the *bangara* ('Big Man' and calendar-keeper) of the Solomon Islands (Green 1998, p. 191), the Inca 'Rememberers' (Couch 1989, p. 593) and the American Indian Shoshonean 'talker' (Moore 1983). The Pueblo 'Sun chief' or 'sunwatcher' controls the calendar, granting him a role equivalent to a chief in the society (Reyman1987, pp. 123-9).

Within North American indigenous cultures, certain individuals were viewed as having important roles as keepers of traditional knowledge. Elders of Indian tribal communities have been viewed as the most knowledgeable people among Indians (Fixico 2003, p. 74). In Pueblo cultures, for example, there is no hierarchical structure based on material wealth. Rank may be hereditary, but is also dependent on ceremonial knowledge, character, interest, mentality (in particular memory), the ability to know long and difficult chants along with oratorical skill (Reyman1987, pp. 123-9). The powerful political role of 'medicine' societies among North American Indian cultures is exemplified by the *mitewiwin* of the Ojibwa (Vennum 1978) and *kachina* clans of the Hopi (Titiev 1972). Although often known as the 'medicine men', these societies performed many tasks other than healing, often also acting as tribal historian (Vennum 1978, p. 753)

A similar pattern can be seen in African traditional cultures. Roberts and Roberts (2007, p. 21) argue that, in many African societies, power derives from unequal access to knowledge, its ownership, protection, transmission, and the retelling to meet current political needs. They consider that the control of knowledge is key to understanding many traditional African political systems, such as the Luba royal culture. Within the Luba, the *Mbudye* secret society retains control of knowledge while serving the king or chief. Experts within African oral cultures, the so-called encyclopaedic 'men of memory' or oral historians, know more than any other because they systematically pursued historical information, often out of sheer curiosity (Vansina 1985, p. 151).

African oral specialists are central to the development of political power (Vansina 1960;

Schmidt 2006; Akinnaso 1992). Examples include the *bulaam* of the Kuba (Vansina 1985, pp. 109-10), the Xhosa *imbongi* of Southern Africa and the *griot* of West Africa (Kascula 1999), the Haya *embandwa* (Schmidt 2006), the Yoruba *Babaláwo*, the practitioners of *Ifá* (McClelland 1982) and the *Bambudye* society of the Luba (Reefe 1977). Studstill (1979, p. 71) refers to the members of the African secret societies of Congo tribes as the 'educated elite' (1979, p. 71). Within the Yoruba people, most kings maintain an advisory group of oral specialists, but even those who do not hold political office are extremely powerful (Akinnaso 1992, p. 101). Little (1949) links the role of West African secret societies to specialization. For example, in the Akan states of Ghana, there are at least 11 different oral specialists, each of whom had to remember a particular part of the state history and transmit it to his or her successor in office (Vansina 1985, p. 38). Comparing various African traditional cultures, Vansina argues that specialists, such as iron smelters or medicine men, have information about their craft that is simply not accessible to others due to its complexity and its often esoteric nature (Vansina 1985, p. 154-5). Similarly, each one of a group of secret societies in West African Kpelle cultures controls particular aspects of the knowledge system (Murphy 1980, p. 195), while the 'claim to esoteric knowledge constitutes their significance as mysterious, powerful, and dangerous' (Murphy 1981. p. 670).

The power of the knowledge elite tends to be reduced in larger, sedentary cultures where specialisation occurs between different roles within the society. As Goody describes for the African Gonja, performers tend to be of lower status than the recipients for whom the performances are directed, usually a senior chief and his entourage (Goody 1987, p. 105). In the Mesoamerican Inca empire, the *quipumayos* retained a historical information in memory, assisted by the mnemonic device which will be discussed more fully in Chapter Three, the *khipu*. Serving the ruler, the Inca, the *quipumayos* maintained extensive lineages to support claims for rights, property and for power (Niles 1999). These societies are clearly not egalitarian.

It is the pervasive role of the knowledge elite in small-scale oral cultures which will be assumed in the prehistoric cultures explored in Part Two of this thesis. In the transition from small-scale hunter-gatherer cultures to larger sedentary farming communities, the role of the knowledge elite gradually changes from one of total power, to specialist societies serving the chiefs or kings. It is this transition, this thesis will argue, which can be seen in the material remains of the enigmatic monuments associated with cultures in the very early stages of settlement.

Public and restricted knowledge

Knowledge is stored in both public and restricted forms. Public narratives are adapted

to new knowledge, changing with fashion and the whims of the narrators, usually in response to their audience. 'Public' song-poetry is communicated to all within the culture. Although adaptable, the public chants and narratives will maintain an underlying consistency of theme (Couch 1996; Finnegan 1988, pp. 69-70; Ong 2002). Using the Kuba as an example, Vansina (1960) quotes the theme of the story, the sequence, the essence of the episodes, the names and places, and the general indication of time as remaining traditional, while the singer is able to vary the story and the telling of it. Goody (2010) argues that many recitations, such as the 'Myth of the Bagre' of the African LoDagaa, vary significantly over time. But the sequence of ceremonies, stored in the White Bagre, is less variable. The structure is maintained.

Although public knowledge may be adapted, there is a great deal of information which must be maintained accurately or it would prove useless, such as navigation routes, seasonal information, genealogies, animal behaviour, plant properties, astronomy and so on. Not surprisingly, oral cultures have methods by which non-varying data can be maintained accurately in oral tradition, and one of the critical components is by restricting the repetition of the knowledge to a limited number of individuals under controlled circumstances.

Restricted knowledge

Hugely different cultures show the same pattern of increasing restriction as the knowledge becomes more complex (Couch 1989, pp. 593-4). This is observable in cultures as different as the Australian Yolngu (Morphy 1991, pp. 77, 92-4), the Baktaman of Papua New Guinea (Barth 1975), Tanzania (Schmidt 2006, p. 142), Malta (Turnbull 2002) and North America (Radin 1911, p. 153). For the Native American Pueblo, access to knowledge is restricted and maintained through institutionalised secrecy (Reyman1987, pp. 123-9) while the extraordinary ability to cross open ocean by the Micronesian navigators relies on their accurate song-poetry which is limited to a select few (Hage 1978). Secrecy is rigorously enforced. For example, the Winnebago place guards on all sides when the secrets of society are imparted to the candidate (Radin 1911, p. 153).

Both restricted and public performances may occur at the same time. At the large gatherings at corroborees, Australian indigenous cultures include both restricted and public aspects, depending on the knowledge within the songs and dances (Rose 1992, p. 96). The Australian Aboriginal Dreaming enables vast tracts of the country to be navigated, using cooperation and sharing of the songs between tribes. Rules and rituals provide way for neighbouring tribes to reach agreement on the use of such knowledge and safe passage through another peoples' land (Rose 1992). Without accurate retention of the details of the terrain, the location of waterholes in a very dry country, and the exact landmarks by which to navigate, safe traversal would be impossible. This knowledge is not varied. It is sacred. Layer

upon layer of complexity is gained through initiation into the higher levels. But it is not simply the verses and chants which act as a repository of knowledge. Associated with these are commentaries on the stories. In describing learning the Songlines with the Yanyuwa people of Carpentaria, Bradley (2010) constantly refers to the discussions between Elders which act as commentary on the verses learnt.

Flood (2006, p. 140) writes that public versions exist of Australian Aboriginal myths to be shared by all, but the restricted, sacred instruction, including higher meaning within the myth, is only gained through initiation. The stories of non-literate cultures sometimes appear simplistic. This is because those of us who are not initiated into the culture are only told the public version, the version told to the children to start their training in the knowledge system.

Access to restricted material is not readily available to those outside the culture, and consequently ethnographic knowledge of it is, understandably, limited (Clunies Ross 1986, p. 246). Even anthropologists with decades of close involvement with a given culture found answers were not forthcoming to questions which were restricted, as is indicated in the reports of their field work, such as Rose (1992, p. 30) with the Yarralin, and Bradley (2010) with the Yanyuwa. The Protestant missionary, Rev. W. F. P. Burton was one of the few to write about the powerful African Luba secret society, the *Bumbudye*, while it was still active. Despite a great deal of effort, he was unable to gain any information about the upper three levels of the seven level initiation system (Studstill 1979, p. 75).

Much of the practical knowledge is taught by women to young girls, and by men to young boys. As restricted knowledge, it would not be available to those of the opposite gender. As Nichol (2011, p. 52) pointed out when discussing research into Australian Aboriginal cultures, the fact that most anthropologists were male meant that the women's initiation and learning was greatly underrepresented in ethnographic reports.

Restricting knowledge increases power

With the Australian Aboriginal cultures, the greater the secret knowledge and authority, the higher the status; men do not acquire full knowledge, and so attain status and authority, until they are quite old (Stanner 1979, p. 39). Morphy writes that the

> creation of secret knowledge is part of the process of mystification by which other members of the society are persuaded by the authority and power of those without access to it. Control of such knowledge enables groups of people – elders, members of a secret society – to exercise some degree of control over other members of society (1991, p. 77).

Schmidt writes that in Tanzania:

> the groups that directly controlled iron production did so with highly esoteric technological and ritual repertoire. The ritual that surrounded iron production mystified the technological process to such a degree that it appeared to be mastery over something natural, human fecundity, rather than control over specialized technological knowledge. Such powers of mystification conferred certain economic advantages to the groups that controlled them (2006, p. 142).

Couch (1989, p. 593) describes the instrumental knowledge – calendars, agricultural practices and navigational knowledge – as being more restricted, and more jealously guarded, than the public knowledge. The Inca, for example, retain their astronomical knowledge orally with the oral specialists known as 'rememberers' as a critical part of the administrative structure. Oral accounts of the past were maintained in two versions, one for the elite and the other for public performance (Couch 1989, p. 593). Couch goes on to describe the way the sun chiefs of the Hopi, the navigators of the South Seas and the day-keepers of contemporary Maya are examples of oral specialists who maintain a knowledge monopoly. As the Hopi oral specialists say: 'Power talked about is power lost' (1989, pp. 594-7).

Heightened experience induced by secrecy within the training rituals increases the force of the knowledge and the basic criteria for its validity – that these are the secrets transmitted from the ancestors before they died (Barth 2002, p. 5).

By restricting information to an elite group through initiation processes, more accurate retention of critical knowledge can be assured. Restriction helps to avoid imperfect repetition of knowledge. Oral specialists instigate formal methods for ensuring accurate rendition of the songs. For example, when recording Wihu festival songs in the Rera (Ronrang) variety of Tangsa, India, linguist Stephen Morey noted that 'one of the singers (Mohen Rera) did most of the singing, and the other (Womjong Rera) responded with a formulaic and repeated refrain:

> *"It will be good for eating, like the deep place where the fish are."*
> *"It is true, it is right."*
> *"It will be good for eating, like the deep place where the fish are."*

Its purpose was to confirm to the listeners, and perhaps also to the spirits, that what Mohen was singing was correct. Mohen had said that to sing incorrectly would be dangerous' (Morey S 2009 pers. comm., 28 March). The reliance on the presence and confirmation of

other knowledge specialists to ensure accurate rendition has been noted for cultures as far distant as Australia (Haynes 2000, p. 63) and Africa (Vansina 1971, p. 446).

Knowledge is traded

Not only material goods are traded. There is broad evidence that knowledge, in the form of song, has been purchased or traded by the knowledge elite of oral cultures in a wide variety of cultures. In fact, in Australia, Turnbull argues that 'knowledge is the primary marker of status and an item of exchange' (2000, p. 34) while Peterson refers to Australian cultures as 'economies of knowledge' (Testart et al. 1988, p. 21). Songs are traded in New Guinea and on the Trobriand Islands (Vansina 1985, p. 98), within the 'Grand Medicine Society' of Northern America (Radin 1911, p. 150; Rajnovich 1994, p. 61), Californian hunter-gatherer cultures (Hayden & Vileneuvre 2011, p. 349) and in Africa (Goody 1977, p. 42). Australian songs, dances and even whole ceremonies are traded, often in return for desired trade goods and ceremonial artefacts (Clunies Ross 1986, p. 238; Flood 2004, p. 268; Turnbull 2000, p. 34). According to Flood, a ceremonial dance appeared on the Great Australian Bight only 25 years after it was first 'exchanged' in northwestern Queensland, over 16,000 km to the north (2004, p. 273). Ellis and Barwick (1989, p. 30) write that the selling of ceremonies is well-documented. One of the routes for transmission they document, between Alice Springs and Port Augusta, is over a thousand kilometres, yet women who had purchased the ceremony could give very detailed information about the places named within the song series.

Systems of gift exchange are found among many communities worldwide, but those gift exchanges are not only of material goods. Knowledge is a valued resource that is also exchanged. Root writes that the *hxaro* is a system of delayed gift exchange among the !Kung San hunter-gatherer culture of Southern Africa which serves to spread information and confirm social relations. *Hxaro* chains extend hundreds of kilometres, although knowledge of others on the chain usually extends less than eight links. *Hxaro* partners are distributed regionally in order to grant broad access to resources, mates and information, as well as secure food supplies during periods of local scarcity (1983, p. 204). Similarly, Malinowski writes that customs, songs, art motifs and general cultural influences are exchanged in the ritualised Kula gift exchange ring of the Trobriand Islands. Within the Trobriand culture, 'spells' are known only to a select group that may be purchased, given as a gift or inherited, after which they are taught in instalments (1979, pp. 168, 216).

Sometimes training is bought with labour rather than material goods. For example, a boy often begins his training in the West African *Ifá* divination and knowledge system around the age of seven. The initiate lives with his teacher and provides labour with domestic or

farming duties as well as acting as a messenger with other *Babaláwo*. Every day, the trainee must learn a quota of verses on which he is regularly tested (McClelland 1982, p. 87-8).

Formal knowledge is formally taught

If knowledge is equated with power in small-scale oral cultures, then it is essential that the role of memory is acknowledged by scholars. Oral specialists work hard to commit formal knowledge to memory. In non-literate societies, huge community investment, including labour, is devoted to institutionalised education (Akinnaso 1992, p. 81).

Havelock (1963, p. 41) claims that there is an assumption that the preservation and transmission of the laws, traditions, history and technical skills of an oral culture 'is left to the unconscious mind of the community and to the give-and-take between the generations without further assistance' and concludes that 'it is never the case.' There is always formal teaching of the knowledge, usually through various levels of initiation into ever more restricted knowledge.

Misconceptions about the lack of formal learning in oral cultures is promoted by prominent anthropologists, such as Stanley Diamond. In concluding a book on anthropological perspectives on education, Diamond regrets the lack of interest in education within 'primitive societies', which he represents as having no formal schooling. All learning is, according to Diamond, embedded in socialisation. He states that there are no learning institutions, no examinations systems and no 'educational elite'. The actual process of learning was 'rarely, if ever, subject to careful and informed scrutiny'. He even goes as far as to state that '[f]ormal schools in primitive societies would be as strange and repugnant as jails' (1971, p. 301).

Objecting to Diamond's claims, Studstill, having been initiated to the first level of the Luba *Bumbudye* secret society, argues that the learning structure involved precisely the sort of impersonal, hierarchical, formally examined learning groups, leading to an educated elite, which Diamond associates only with modern schooling (1979, p. 76). Studsill also quotes other well respected anthropologists, such as Levi-Strauss and Mead, criticising their implication that education in 'primitive' societies was an informal process of enculturation of children through kinship over the lifetime of the person (1979, pp. 68-9). Despite his landmark work on primary orality, Walter Ong wrote that '[h]uman beings in primary oral cultures, those untouched by writing in any form, learn a great deal and possess and practice great wisdom, but they do not 'study'' (Ong 2002, p. 8). Diamond and Ong demonstrate the lack of recognition of formal schooling recorded in traditional cultures all over the world.

Mobile hunter-gatherer cultures, such as the Australian Yarralin people have formal contexts in which gender-specific knowledge is communicated (Rose 1992, p. 114).

Schooling becomes more formalised with settlement. The Baktaman of New Guinea, for example, are trained from childhood for over 20 years through seven degrees of stepwise initiation (Barth 2002). Studstill describes formal schooling in non-literate cultures, such as the New Zealand schools which were opened for five months of the year during which the young Maori studied from dawn until midnight (1979, p. 70). There were numerous stages and sub-stages of initiation into the Luba secret society, the *Bumbudye*. Payment of fees was required at each level (Studstill 1979, pp. 72-3). Vansina talks about formal schooling in Rwanda, Hawaii, the Marquesas Islands, New Zealand, among the Inca, as well as through levels of initiation in the non-centralised societies found all over the world (1985, pp. 47-8). Goody describes the teaching of the LoDagaa Bagre when the Neophytes are shut in for many hours in the long-room of the house while the elders repeatedly recite the long 'myth'—Goody likens the process to formal schooling in literate societies (1987, p. 150-1).

Formal teaching is recorded for pre-historic non-literate cultures, such as that of Britain at the time of the Roman invasion. Caesar, who invaded Britain in the first century BC, reported the presence of the oral specialists who were exempted from military service, taxes and civil duties. 'These pupils are said to learn by heart a vast number of verses. Some, in consequence, remain under teaching for as many twenty years' (Caesar as quoted in Ellis 1980, p. 30).

Within the Ojibwa(y) of North America and Canada, the *mitewiwin* (also written *mide*) (Grand Medicine Society) train in the song-poetry to a number of different levels, each requiring stressful examination of every detail, especially of the origin-migration songs which are central to the oral tradition (Radin 1911, p. 188). The Ojibwa are recorded as training *mite* at ten years old (Vennum 1978) with initiates spending years learning the wisdom of the medicine songs and scrolls (Rajnovich 1994). Over 1000 songs were known to be used in the rituals, including medicinal, historic and cultural laws, among many other themes. Animals featured heavily. This knowledge was expected to be recounted exactly, without mistake. Although there were public songs known to all the tribe, the *mite* training was sacred knowledge, limited to the initiated, with mnemonics recorded on the sacred birchbark scrolls which could only be 'read' by those trained within the Society. Should a *mite* lack suitable initiated heirs prior to his death, then his mnemonic scrolls and ritual paraphernalia would be burnt to ensure that they did not get into the hands of the uninitiated (Radin 1911; Rajnovitch 1994; Vennum 1978)

Within the Pueblo cultures of Southwestern United States, much preparation is put into the calendrical initiation into sodalities which

> involve a *permanent* change of status for an individual candidate. At these affairs the

> many baskets of flour and bread and bowls of meat provided by the initiate's family are shared equally by the households and relatives of sodality members, who have patiently devoted the past year to the revelation of their esoteric arts (Ford 1972, p. 10).

With anthropology qualifications from both his homeland of Nigeria and from the United States, Akinnaso (1992) rejects the idea that education in non-literate societies is purely informal, or that certain areas of knowledge, including science, are linked specifically to literacy. He provides a detailed analysis of the formal and highly disciplined learning schools and of complex cognitive and mnemonic devices used in Africa. He describes the many years of training within a range of what he refers to as 'secret societies' of Western and Eastern Africa, such as the Poro of Sierra Leone and Liberia, the Luba of Zaire and the Yoruba diviners of southwestern Nigeria. Akinnaso argues that the 'major misconception is that education in non-literate societies either does not exist in terms of organised training or the systematic transfer of advance knowledge or, if it exists, does not promote social differentiation or foster sub-cultures' (1992, p. 69). Akinnaso acknowledges that 'literacy involves major changes in forms of communication and the organization of knowledge' (1992, pp. 71-2) and agrees with major researchers on the social, political, economic, and, especially, cognitive consequences of these changes. He includes Havelock, McLuhan, Ong, and early Goody among those who commonly assume that schooling developed only after writing was adopted. He rejects the concept that the development of writing is also linked to that of science as initially argued by Goody (1977, p. 51).

Generalisations about hunter-gatherer cultures are often made from !Kung studies. For example, Biesele (1986, p. 163) argues that hunter-gatherer learning is informal, but makes specific reference only to the !Kung. As is acknowledged in the foreword to the 1999 edition of Marshall's seminal work on the Nyae Nyae !Kung, 'the !Kung knew both black and white people, and they used many artefacts obtained from those communities' (Marshall 1999, p. x-xi). They had no knowledge of stone tools, only of the metal knives they currently used (Marshall 1999, p. xi). In fact, Kelly writes that 'Bushmen have not been "pure" hunter-gatherers for at least several hundred years, perhaps more than a millennium' but are 'the lowest strata in a class society' (1995, p. 27). Consequently, generalisations about hunter-gatherer knowledge structures from the !Kung may not be as instructive as those drawn from Australian cultures, or from cross-cultural studies such as Morley (2006).

In Australian Aboriginal cultures, Flood writes that it took 30 or 40 years for initiates to learn the full song cycles and dances, know all the sacred sites, sacred objects and designs associated with each ritual performance. 'Authority rested with these legitimate keepers of ritual knowledge, and tended to increase with age' (2006, p. 157). Nichol (2011, pp. 53-5)

describes the way in which central-western New South Wales cultures involved little formal instruction for children who learnt by imitation of adults. At the time of initiation, however, initiates were removed from the community for an intensive period of instruction in sacred, social, artistic and environmental knowledge. The entire society made economic sacrifices in order to ensure that initiates received this intensive formal training. Nichol generalises across Australian and Melanesian cultures by saying that 'to be truly knowledgeable one needed to have high ritual status and age; the authority, control, influence and prestige came with knowledge was not open to young people' (2011, p. 56).

The integrated nature of traditional knowledge systems

Non-literate knowledge systems are structured according to rules which are alien to the Western scientist. Instead of knowledge being stored according to topic, oral cultures explore their understanding in a much more integrated format. Rigorous classification of knowledge came with the logical structure of the storage of knowledge in writing (Fentress & Wickham 1992).

A Dreaming story of an Australian Aboriginal culture, for example, may tell of the creation of the landscape, the natural history of an animal species and the expectations of the people who claim that animal as their totem, while entertaining and teaching moral codes (Rose 1992)—a trait which can be seen in many documented songs (see for example Dixon & Koch 1996; Doring 2000; Goddard & Kalatos 2002; Perrurle Dobson 2007). Aboriginal stories, songs, dance and paintings combine as ways of retrieving both history and mythology from the landscape, working together as social memory. These display both extremely long-term continuity and considerable negotiability (Rumsey 1994). Some stories or dances, however, may tell the specific information needed, such as the Yolgnu Bee-fly Ancestor dance (Graham 2006) showing how to track a tiny parasitic fly to locate honey.

In *Dyirbal Song Poetry* (Dixon & Koch 1996), the practical and didactic aspect is clear within the collection of 174 of the much larger body of songs of the Australian Dyirbal language group song specialists. Along with the specialists' retention of the complex kinship system, and associated social responsibilities, much of the daily singing pertains to everyday events – the birds, mammals, fish, insects, reptiles, techniques for hunting and fishing, about places and the land, the cause of thunder, the cause and cure of illness, love, grief and bravery, plus historical events of the distant past but also quite recent events. A song telling of the breaking of the edible bulbs of an indigenous plant, say, would be combined with an account of the related creation time. Now released to non-indigenous researchers due to the few remaining Elders' fear that they will otherwise be lost, these songs still probably represent the public level, higher learning contained within the restricted repertoire.

McClelland (1982) describes not only the divination aspect of the *Ifà* cult of the Yoruba, of West Africa, but also the way in which the oral literature memorised by the 'priests', or *Babalaéwo*, encodes an extensive, and integrated, knowledge system. Known as the Odù Corpus, the 260 sets of ordered verses include stories of varying kinds, from myth to straight narrative. Encapsulated within this vast corpus is acute observation of animal behaviour, the twisting of snakes in the trees in battle, the shape of badger burrows and the different birds' nests, along with details of the way the animals move on land, in water or in the air. Animals are used within parable, as conceptual metaphors for human behaviour and moral lessons. There are many examples of plant properties, for eating, building, weaving and for the pharmacopoeia. A high proportion of verses deal with the theme of death, while others include descriptions of the rivers and their navigation. There is a body of law giving precedence for almost every conceivable situation, how the law is to be administered impartially, rights of every party, and how disputes are to be resolved. They are verses covering fair dealing in trade, the use and abuse of power and authority, and an orderly framework for the election of local leaders. The historical aspects include such things as the defeat of the Ìgbò due to the development of iron weapons, the introduction of wrestling and of Islam, the development of markets, towns, buildings, gates and roads, the way in which kingships developed and consequently the rules for choosing kings and chiefs. Material mnemonics are used to assist with memory and sequencing the Odù Corpus, as will be discussed in Chapter Three.

At any given time, someone familiar with the entirety of their own oral tradition can extract from it what they need for any given occasion—the behaviour of a prey animal, the properties of a plant, the route to follow to arrive at a desired location. There is no need at any time for all this information to be gathered together into a single song or story. Should a researcher from a literate knowledge system ask about a particular bird, say, then the elder may extract the knowledge from the mythological stories and dances to present the combined information as Western science needs.

Conclusion

Geographically diverse oral cultures maintain complex formal knowledge systems–the corpus of knowledge required for a society to survive. There are compelling reasons to suggest that *all* oral cultures maintain a knowledge elite and formally train initiates in the knowledge of the culture into an integrated system of pragmatic, religious, historical and metaphorical knowledge. The dichotomy between public and restricted knowledge is a dominant feature of all oral cultures, a feature which shows up strongly in the prehistoric architecture to be explored in Part Two.

Even with repetition and formal training, the human memory is unreliable. With no writing to reply on, oral cultures have developed mnemonic technologies to aid memory of the knowledge on which their culture depends. It is these technologies which will be the subject of the next two chapters.

Chapter Two: Primary orality and oral mnemonic technologies

Introduction

> In all societies the bulk of the information used to organize conduct has been accumulated and preserved by prior generations. Communication is the core process of all human societies. Consequently a comprehensive theory of social life must attend to how information is accumulated, preserved and shared (Couch 1996, p. 15).

The methods by which information is accumulated, preserved and shared within purely oral cultures rely solely on memory. These methods have been given some attention by anthropologists but almost none by archaeologists. This chapter will explore the oral technologies used across a broad range of oral cultures. As will be shown in this chapter, performance is a critical aspect in storing information. Areas such as ceremonial sites, plazas and forecourts, contemporary or archaeological, are usually described as being used for performance of a religious nature. This chapter will show why interpretation of these performance sites also needs to consider the processing of information, including the pragmatic and scientific knowledge of the culture. The next chapter will explore the associated material mnemonic devices which will give a new lens with which to explore enigmatic material remains in the archaeological record.

It is widely acknowledged that oral tradition serves the needs of religion, recording historical information and recalling stories of people and events which hold significance for the culture. But it is the didactic role of oral tradition which is the focus of this thesis. People need to eat, drink and find shelter to survive. They need to abide by rules which enable a number of humans to co-exist, and they need to know their environment intimately in order to exploit it for resources, avoid danger and navigate it to meet other groups to trade, to fight, to make peace and to marry without risk of inbreeding. There is simply too much information to be retained by natural, fallible, unaided human memory. This information must be formally accumulated, preserved and shared—formally taught, carefully maintained. The songs, poetry, rhythmic chants of oral cultures are not simply exotic rituals to be compared with hymn singing and religious rituals in literate cultures. Songs in traditional cultures are a matter of survival. Havelock describes the primary role of pre-literate verse as didactic, as ‘[a]cting as a kind of versified encyclodpedia’ (1986, p. 29).

Whether talking about contemporary non-literate cultures, contemporary literarate

cultures, or speculating about oral cultures in the distant past, the socio-political cohesion of the society must depend on the media used to communicate and to store information. As McLuhan argues, social and cultural changes can only be understood through a knowledge of the workings of media used to communicate information (McLuhan 1965; 1967; McLuhan & Fiore 1967).

Within this thesis, terms will be used as defined by Goody (1987, p. x), whereby 'non-literate' refers to the absence of a written tradition, while 'illiterate' refers to a low level of literacy within a written tradition. The term 'oral culture' will be used for non-literate cultures only. It is essential, when looking for the structures of primary oral cultures, that the researcher be constantly aware of the influence and proximity of literacy, even when the culture itself has no written form. Goody warns about the Islamic literate influence on many of the south-east Asian and African cultures, commenting that they 'require an analytic treatment different from that given to an Australian tribe' (1968, p. 5). It is the more recent contact date for Australian cultures, in particular the Western Desert and Arnhem Land cultures, which is the reason this thesis draws more heavily on Australian hunter-gatherer experiences than those from Africa.

Natural and artificial memory

Without writing, accumulation and preservation of information must be in memory, and it is directly from memory that the information is shared. 'Memory is often considered as a storehouse, but for oral traditions a better metaphor is that of a well-practised skill dependent on extensive experience' (Rubin 1995, p. 146).

The ancient Greeks differentiated between 'natural memory' and 'artificial memory'. Natural memory is when you remember something because you are reminded of it as you think while artificial memory is memory which has been reinforced by training (Yates 1966, p. 5). Artificial memory systems were developed and used in Europe from at least the beginning of the Upper Palaeolithic by individuals specialising in storing memory (d'Errico, 1998, p. 43). This chapter will show that the practiced use of artificial memory is a pivotal component of all oral cultures.

Memory practices are commonly divided into 'incorporated memory', which involves physical performance and high emotion for transmission, and 'inscribed memory', which involves some form of material storage (Connerton 1990, pp. 72-7; Rowlands 1993, p. 142; Whitehouse 1992, p. 775). Connerton describes the transition from an oral culture to a literate one as a transition from incorporating practices to transcribing practices (1990, p. 75). A number of writers have questioned whether the social memory of a culture could be so clearly divided (Houston 2004, pp. 224-5; Van Dyke 2009, p. 222). Although this division may have

some relevance when discussing natural memory, it is not as meaningful when considering the artificial memory practices essential in maintaining the store of knowledge associated with contemporary oral cultures. Poets and singers in oral cultures act as the reservoirs for knowledge for the entire society. Fentress and Wickham (1992) consider social memory as a source of knowledge for the group. They define 'social memory as an expression of collective experience: social memory identifies a group, giving it a sense of its past and defining its aspirations for the future' (1992, p. 25).

The orality / literacy debates

The widespread use of the term 'orality' follows Walter Ong's hugely influential book *Orality and literacy: the technologizing of the word*, first published in 1982 (Ong 2002). Although the Oxford dictionary defines 'orality' as 'the quality of being verbally communicated' (Oxford 2011), the use of the word in the academic literature is more specialised. In an oral culture, there is a dichotomy between everyday language and the standardised procedures used to create song-poetry which Couch (1989, p. 589) refers to as an 'oral technology' or 'orality'.

Orality studies emerged as a response to the analysis of the songs of Yugoslavian 'singers of tales' by Milman Parry and Albert Bates Lord, likening the singers to the Homeric tradition (Lord 1960). Lord found that epic singers drew on a stock of verbal formulae, rhythmic and thematic constructs and narrative incidents, which were then combined into improvised poetic performances which recreated the stories handed down to them as their oral tradition.

Viewing the Balkan peasantry poets as the equivalent of pre-literate Homer has been questioned by some scholars (Goody 1987; Havelock 1963). Havelock writes Homeric poetry was 'the sole vehicle of important and significant communication… called upon to memorialise and preserve the social apparatus, the governing mechanism, and the education for leadership and social management' (1963, pp. 93-4). He describes poetry, as it is known in an oral culture, as 'first and last a didactic instrument for transmitting the tradition' (1963, p. 43). By contrast the Balkans had relied on literate record for pragmatic business for over 2000 years (Havelock 1978, p. 336). Consequently, Havelock sees the Balkan singer primarily as an entertainer while pre-literate poets, such as Homer, framed their society's understanding of law, history, religion and technology (1963, p. 93). Havelock considered pre-literate poetry as an art which is 'central and functional as never since. It enjoyed a command over education and government which was lost as soon as alphabetic literacy was placed at the disposal of political power' (1963, pp. 93-4). Lord (1991, pp. 1-2), however, argues that Havelock underestimates the political role of the Balkan poets. This is not poetry as we know it, but the

poetry that Plato rants against for much of *The Republic* (1955 [380-360 BC]), the song-poetry of Homer—an epic form defined by Finnegan as 'a long narrative poem with an emphasis on the heroic' (1977, p. 9). However, epics are not commonly found in primary oral traditions (Clunies Ross 1986, p. 262; Finnegan 1970; Goody 2006; Vansina 1971, p. 450) and consequently are not an area of focus for this thesis.

The term 'oral literature' is now widely used to refer to the song-poetry of oral cultures. Ong refers to 'oral literature' as 'a strictly preposterous term' (2002, p. 10) likening it to 'thinking of horses as automobiles without wheels' (2002, p. 12). Goody objects to the term for reasons similar to those of Ong, but accepts its broad usage although personally preferring the term 'standardized oral forms' (2010, p. 42). In a vigorous defence of the term 'oral literature', Lord claims that he is using the term for 'products of verbal expression of high artistic quality' (1991, p. 16). Finnegan (1988, pp. 61-6) supports the use of the term 'oral literature', arguing that the various functions of literature in literate societies are also found in the song-poetry of non-literate cultures all over the world—aesthetic composition, intellectual expression, an ability to deliver insight into, and understanding of, the human condition and draw universals through narrative.

The World Oral Literature Project, affiliated to the University of Cambridge Museum of Archaeology and Anthropology, offers as its mission statement: 'An urgent global initiative to document and make accessible endangered oral literatures before they disappear without record' (Turin 2011). This sense of urgency is felt among researchers around the world. John Bradley expresses the urgency in recording Australian songlines, noting that there were, at the time of writing, only eleven Yanyuwa speakers left who can convey this knowledge for their culture (2010, p. xiv). Linguists at the Research Centre for Linguistic Typology at LaTrobe University are working to record a grammar for a range of fast disappearing oral languages. Stephen Morey, working with the Tangsa languages in northeast India, notes that the grammar for the song poetry, the oral literature, is significantly different and more complex for linguists to record and translate than the language of daily discourse (Morey S 2009 pers. comm., 28 March).

In his summary of the 'oral-literate equation', Havelock (1991) indicates Africa and Polynesia as being particularly useful sources of primary oral material, albeit compromised by literacy, having also mentioned a wide range of other areas the world. He does not, however, mention Australia at all. As Australian indigenous cultures are considered as representing 'the oldest living culture in the world' (Flood 2006, p. 133), the discussion of the oral-literate equation would greatly benefit from the work of Australian indigenous people and anthropologists. This thesis, and in particular Chapter Six, addresses this deficiency.

The orality / literacy dichotomy

Within the humanities and social sciences, there has been a tendency to dichotomize human societies into literate and oral cultures (Brokaw 2010, p. 8). Havelock and Ong assert that writing radically changes the entire mode of thinking of a culture, enabling philosophy and science in a way which is not possible with the mode of thinking in oral cultures (Havelock 1963; 1991; Ong 2002). Other researchers believe that the impact of literacy on human thought is exaggerated (for example, see Feldman 1991; Finnegan 1988). Denny argues that 'Western thought has only one distinctive property separating it from thought in *both* agricultural and hunter-gatherer societies–decontextualisation' (1991, p. 66), that is, the disconnection of information from its context. He goes on to argue that all human thought, non-literate and literate, involves 'rationality, logic, generalizing abstraction, insubstantial abstraction, theorizing, intentionality, causal thinking, classification, explanation, and originality' (1991, p. 81). As Innis writes: 'The impact of writing and printing on modern civilisation increases the difficulties of understanding a civilisation based on the oral tradition' (1964, p. 41). The difference in ways in which information is stored and transmitted, especially the use of mythology as discussed below, leads to a superficial assumption that oral cultures tend to live in a fog of superstition. Biakolo writes:

> perhaps the commonest in all anthropological-philosophical discourses of this sort … is the notion that the magical, with its connotation of, and connection with, ritual and religion, is the dominant characteristic of all primitive thought and behavior. The volume of anthropological research, from James Frazer upwards, demonstrates that this assertion is indeed overwhelming. What is not so certain is the theoretical justification for this. .... Why, for example, is the comparison not made within the same experiential domain, say, between traditional religious thought and modern Western religious thought? Or alternatively, between an instance of traditional nonreligious thought and science? (1999, p. 52).

Although, throughout this thesis, I am using the dichotomy between oral and literate cultures extensively, I am doing so only in terms of the way knowledge is acquired, stored and transmitted and the separation does *not* imply that I accept many of the cognitive transformations which are claimed to be the result of literacy. As will be shown in Chapters Four and Five, traditional cultures store a great deal of empirically derived natural science knowledge. Couch (1989, p. 589) argues that scholars have given undue significance to epics, while ignoring the ethnographic data from contemporary non-literate societies which indicate

the ability to retain large quantities of information regarding calendric, agricultural, navigational and genealogical knowledge. It is this pragmatic knowledge which has been neglected within the discussion of primary orality, a flaw this thesis sets out to address.

Goody writes that

> It seems to be in these early literate societies that the strong development of mnemonic skills and aids-memoires is first found; these forms of assistance to memory are largely linked to writing, to 'visible speech'. In purely oral cultures, re-creation usually takes the place of a concern with exact recall (2010, p. 46).

Although I do not question Goody's argument that recall is not word perfect in oral cultures, I do question the argument that strong mnemonic development is not present. It will be shown in this chapter that many oral forms serve a mnemonic purpose while the next chapter will give extensive evidence that material mnemonic devices are found extensively across oral cultures and are usually significant within them. The oral mnemonic technologies discussed in this chapter evolved because these were methods that worked. Over millennia, these techniques were constantly improved. Technologies which were not effective were lost while those that were effective were developed. It is no surprise that similar technologies arose in unrelated cultures, albeit implemented in idiosyncratic ways.

Data, information and knowledge systems

The terms 'data', 'information' and 'knowledge' are often used interchangeably in general conversation. I am drawing on the use of these terms in information systems (Kelly 1987) but applying them beyond the modern computer-based context. This reflects the way the terms are used in the field of secondary orality, which refers to oral communications using electronic means, such as by telephone, through television or using computer communications.

'Data' refers to the raw facts—the behaviour of an animal, the properties of a plant, the position of the stars. 'Information' is structured data—data which is organised, indexed or stored in some way which can be searched. Oral tradition is a structured system, ordered according to the landscape, calendar and/or other devices, so the songs, dances and poetry serve as information sources. Knowledge is information which is reflected upon and integrated within a culture.

For example, for the Waanyi of northwest Queensland, 'Wild Dog Dreaming' draws on the data of dog and human sexual behaviour. The information is stored in the songs and stories which form the Dreaming. The knowledge includes the commentary on the

information, 'much of which had to do with incest and taboos for the teachings of proper human sexual relationships, in contrast to that of dogs… the key story relates the rules of human procreation' (Tacon 1980, p. 170).

Oral tradition as an indexed information system

Unless the data contained in the thousands of songs, poems and dances is held in some form of structure, then there is a great risk that the information will be lost, as recalling a thousand unrelated incidents without any structure or sequence would be beyond the capacity of any human brain. Sequence aids recall and facilitates articulation (Fentress & Wickham 1992, p. 28). The Ancient Greeks, when discussing the memory methods of their orators, noted that an orderly arrangement of the narration to be remembered is essential for good memory (Yates, 1966, p. 2). Epics, such as the *Iliad*, involve a huge number of events. By combining into a sequenced story, with vivid scenes and lively characters, the entire set of incidents can be recalled. 'The contexts of the *Iliad* are the page references to the oral memory' (Havelock 1963, pp. 175-6).

Not surprisingly, it was not only the Greeks who ensured their information was sequenced. Formal sequencing was found in all the oral traditions which were explored in the research for this thesis, although the implementation was culturally specific. For example, the symbols learned by Studstill (1979, p. 75) during his first level of the seven-level African Luba initiation, were presented in a specific sequence. The symbols represented primal spirits whose stories were told and danced in sequential mythological time. Stories associated with each of the cosmological spirits and cultural heroes ensured that the knowledge was retained in a structure, reducing the chance of any segment being lost.

Walter Ong argues that indexing the various episodes within oral culture is not possible. In discussing Homer's vast store of episodes about the Trojan War, Ong argues that 'There was no list of the episodes nor, in the absence of writing, was there any possibility of even conceiving of such a list' (2002, p. 140). I will argue that most, if not all, oral cultures have a way of creating just such a sequenced list of the 'episodes' that form the oral tradition. However these methods are subtle, often restricted, and culturally specific. That does not mean they do not exist.

My first insight into the indexing of oral tradition was gained through understanding the role of the Australian Aboriginal songlines, also referred to as dreaming tracks or strings (Rose 1992, pp. 52-57). Each sacred place along the songline acts as a subheading for the knowledge. The songline is, in effect, a table of contents.

> A songline is a long sequence of short verses that form a sung map of the

> Ancestral Being's creative journey. Song cycles may have many verses that must be sung in the correct order. Each verse records the events of a particular site and is repeated several times. Aboriginal elders travelled along songlines with their young people, telling the stories and singing the songs of the sites, so that children acquired a mental map of their country. The words are often special song words in ceremonial language or from other tribal languages. All Aboriginal men were expected to learn them, and the process began at initiation. Elders took initiates to sacred sites at night and chanted the relevant lines over and over until they were word perfect. After years of teaching, the man with the best memory became his clan's main 'songman'. Songmen also experienced new songs through dreams; this was seen as the 'finding' of a pre-existing dreaming song. Epic tribal songs were accurately preserved and knowledge of them conveyed great prestige and power. There are still songmen and women in Central Australia, where songlines commemorating the location of every waterhole were once vital to survival.
>
> Story places may be unmodified 'natural' features, such as waterholes, or can be marked by stone arrangements or rock art. Some dreaming tracks crossed hundreds of kilometres and several tribal territories…. The ritual cycle ensured that sites were renewed through regular visits, when sacred paintings were touched up (Flood 2006, p. 139).

In a detailed book on the songlines of the Yangyuwa people of Carpentaria, John Bradley describes many very long journeys through country and the associated songline, or *kujika*, as a 'Yanyuwa way of knowing' and as the 'key to rich, complex and intricately related knowledge systems' (2010, p. xiii). Bradley shows how the songlines link a variety of song forms, through a deep layering of knowledge with the *kujika* acting as 'the prime source that anchors and connects the knowledge' (2010, p. 198).

Other things may act as an index, such as genealogy. For example, the king lists for Rwanda are structured by their reign and by what type of king they were. This then acts as an index to the many different anecdotes associated with each of the kings (Vansina 1985, p. 166). Goody writes that sequence is essential to the long recitation of the White Bagre of the LoDagaa of Ghana which 'consists essentially an outline and very partial account of what has to be done at varying intervals at each of the ceremonies that take place' (2010, p. 98).

The singing of the list invokes the deeper knowledge among those initiated into it, and consequently an emotional response beyond that which non-indigenous researchers would expect when simply chanting of a set of place names. This response has been noted by Bradley (2010, p. 43) when listening to the singing of Yangyuwa songlines, and Rappaport on

hearing the sobbing of the Tsembaga men of New Guinea when chanting of place names of their territory (1967, p. 177).

The knowledge systems extend beyond the song texts

The importance of the commentary in non-literate knowledge systems is emphasised by Goody (2010, p. 97) when discussing the LoDagaa 'Myth of the Bagre' from Ghana where discussion explains the text of the myth. Spoken texts are also required to interpret the multiple levels of interpretation of Australian Aboriginal songs (Clunies Ross 1986, pp. 241-3). Bradley (2010, p. 37) talks about the way every verse of the sung narratives, the *kujika*, of the Australian Yanyuwa could convey any number of meanings. Every verse had associated commentaries, knowledge built around the information depending on the context of the singing. For one *kujika*, Bradley recorded over 230 verses (2010, p. 183). As always, knowledge is linked to power. Bradley comments that *kujika* 'has always been about politics, prestige and authority. Powerful acknowledgement is given to those who can sing, follow the paths through the country' Bradley (2010, p. 168).

When reading transcripts of indigenous songs, there is often little to be gleaned from them. The commentaries are not there, merely the information. Knowledge is built up over a lifetime, often through various levels of initiation. With the Aranda people of Central Australia, for example, the 'full meaning of each verse had to be brought out by the accompanying oral tradition; and its old guardians saw to it that no one was told the full truth until his personal conduct had proved him to be a man amenable to strict discipline' (Strehlow 1971, p. 681).

Societies that developed effective information technologies had a better chance of survival than those that did not (Couch 1996; Couch & Chen 1988; Ong 2002). Couch (1989, p. 587) argues that 'information technologies are the foundation upon which complex social structures rest'. These technologies involve both the oral technologies explored in this chapter, and the associated material mnemonic devices detailed in the next.

Oral technologies

In order to memorise and recall vast tracts of narrative, oral cultures developed many 'tricks of the trade' – oral technologies to aid them. In oral cultures, distinct features are introduced to the formal language to enhance the memorability of the text. These include the use of formulaic and stereotypical expression, standard themes, adding characterizing epithets to names, repetition, redundancy, praise and blame formats and the generation of exaggerated characters (Ong 2002). Havelock (1978) argued that the control of culture lies in information that is accumulated and recalled, which is rendered in a language specifically used for this

purpose. He concludes 'that its literate successor is the prose contained in the vast accumulation of knowledge, both humanist and scientific, which now lies in the libraries of the world' (1978, p. 335).

Orality is an information technology, a tool which increases the ability of humans to process information and so increase the amount and complexity of information preserved. Ruth Finnegan emphasises the interwoven modes of orality when she writes:

> Orality is revealed as a multiplex rather than a matter of words alone. Many dimensions can enter in: visual, kinesic, acoustic (not just verbal sounds but other sonic effects, too), proximic, material, tactile, bodily presence, and movement – all are potentially relevant, if to varying degrees depending on occasion, participants, and location (2006, p. 278).

Each culture implements these dimensions in their own way. For example, Fentress and Wickham describe the 'mnemonic culture' of the Jörai, a small Vietnamese tribal group which uses a wide range of acoustic resources including rhythm, rhyme, assonance, and alliteration. Auditory sequencing plays a strong role in underpinning Jörai social memory with both conceptual sequences and sequences of images. 'In this way, Jörai social memory seems to be very much predetermined by a set of highly conventionlised mnemotechniques' (1992, p. 37). In the sexually explicit rhythms and movements in the song-poetry of the Haya, in northwestern Tanzania, every phase of the reproductive cycle is incorporated as a metaphor for the phases of iron working (Schmidt 2006).

Tedlock (1971) argues that many of the style elements, critical to understanding oral literature, have been left out of translations by ethnographers. He quotes as an example Oliver La Farge's preface to Theodora Kroeber's *The Inland Whale* (Kroeber 1959) which praises the translations of the stories as having 'simply been put into a familiar idiom, with restraint and good taste, and in some cases purged of the insistent repetitions and clattering details that primitive people often stuff into their stories for ulterior purposes' (1971, p. 114). Tedlock also points out that similes, oaths and strong overtones of monotheism are added by translators but have no existence in the original tradition. Tedlock concludes that oral literature is much more akin to modern oratory and dramatic poetry than to the printed literary style, that the use of repetition and stock formulas, for example, 'must be properly understood as "oral" and not "primitive"'(1971, p. 130). In describing Australian Aboriginal songs, Clunies Ross writes that 'Aboriginal songs, whether sacred or secular, are characteristically elusive and often very short. Verses are often repeated many times. In most aboriginal communities the language of the song is different from that of everyday discourse, sometimes

remarkably so' (Clunies Ross 1986, p. 242).

In *Memory in oral traditions,* cognitive psychologist, David C. Rubin (1995) argues that repetition, alliteration and assonance of sounds are aids to memory. He writes that oral traditions 'are special forms of speech, not special forms of writing, and they must be evaluated as such' (1995, p. 67). Rubin details the way that theme, imagery and rhyme provide oral traditions with flexible mechanisms for stability. It is the repetition within a performance which ensures the audience has grasped what is being said and reinforces memory (Finnegan 1977, p. 129; Biakolo 1999, p. 60). The auditory role is as important, if not more so, than the visual role in the transmission and preservation of information in oral cultures, which depends on frequent and formulaic repetition (Madden, Bryson & Palimi, 2006, p. 41).

While repetition, alliteration and assonance enhance the chance of the information being remembered, formulaic expressions in the form of allusions enables shorthand versions of the information to be conveyed to those within the culture. In discussing the use of allusion in the African context, Vansina writes that allusion is also found throughout oral cultures as it is among literate cultures. 'This is his Waterloo', he notes, would be understood by most from Western culture, without further explanation (1985, p. 88) while similar phrases within oral tradition would only be understood by those from within the culture.

The role of song

Goody notes that in 'purely oral societies, recitations and songs encompass the whole of life's experience, including cosmology and theology' (Goody 2010, p. 47). Indigenous Australian, Eileen McDinny (Yanyuwa) says it differently: 'Everything got a song, no matter how little, it's in the song – name of plant, birds, animal, country, people, everything got a song' (quoted in Bradley 2010, p. 29). In an analysis of the Australian Yolgnu songs, Attwood and Magowan (2003) write that the songs may describe the form, colours, smells and sounds of flora and fauna, formation and dispersal of clouds, the strength, direction and feel of the winds, the availability or scarcity of bush foods and animals over the seasons. Each song focuses on an animal, plant or natural element thus encoding pragmatic knowledge. Morley argues that 'the greater proportion [of hunter-gatherer music] relates stories, descriptions of events, environments, journeys and subsistence sources, and so constitutes an important repository of knowledge' (2006, p. 103). In describing the Odù Corpus of the African Yoruba, McClelland writes:

> The effect of such verses is achieved by the use of literary devices familiar in every part of the world. Onomatopoeia conveys the sound of horses bolting, floodwaters roaring,

> dogs barking and snakes twisting in their death throes. We hear the rattle of seeds in various kinds of containers, bones being crushed and cloth ripped. The different and characteristic sound of drums are discernible. There is great subtlety in the arrangement of tone values and in the balancing of sound units.
>
> One of the most striking is the use of crescendo and climax, often deliberately extended by repetition and refrain. …the printed page cannot give the cumulative effect of the chant (1982, p. 64).

The sounds of the environment can be conveyed very easily in song. As any birdwatcher will know, trying to identify bird songs from a written description in a field guide is close to impossible. By encoding the call of birds in song, a particular bird can be identified. Accurate identification of the birdsong can often mean the difference between life and death. The aquatic diving bird, known as loons or divers *(Gavia spp.)* have a piercing call which is used to detect land when a sailor is lost at sea, by the Tlingit (Garfield and Forrest, 1961, p. 37) and Inuit (MacDonald 1998, p. 186) as no doubt it will have been by other cultures across its wide northern range. The red throated loon *(Gavia stellata)*, for example, is a fairly non-descript bird, especially without its red breeding plumage (see Figure 2.1), but its call is distinctive and this warrants its significant role in oral tradition. Being lost at sea at nightfall in the cold northern climate, in weather conditions which block visibility to landmarks or stars, can be fatal. Loons, unlike many other aquatic birds, reliably return to land each night. Survival can depend on being able to identify the call of the loon among all the bird calls at sea, in order to follow that call to land. Songs encode the call, and are the best way to constantly reinforce the sound into memory. Significant animals may be carefully recorded in the material culture. The Eskimos of Dorset carved minute ivory effigies of animals no bigger than the head of a match. Their precision is such that very similar species can be differentiated when viewed under a microscope, for example, the common loon can be distinguished from the red throated loon (Lévi-Strauss 1966, p. 64).

Figure 2.1. Red throated loon or diver (Gavia stellata) *in non-breeding plumage. Loch Fleet, Scotland. Photograph: David Constantine. Used with permission.*

Finnegan (1977, p. 13) maintains that relatively short non-narrative sung poetry can probably be regarded as universal in human culture, and that singing or chanting is 'the most common characteristic of oral poetry'. Singing messages helps faithful transmissions because the melody acts as a mnemonic device (Vansina 1985, p. 16). For the Australian cultures, Song and Country cannot be separated. The landscape provides a fixed mnemonic structure:

> The Dreaming songs… provide an auditory *mnemonic* (or memory tool) – an oral means of recalling viable routes through an often harsh terrain.
>
> Yet there is another mnemonic structure at work in the Dreaming. … Just as the song structure carries the memory of how to orient in the land, so the site of particular features in the land activates the memory of specific songs and stories. The landscape itself, then, provides a *visual* mnemonic, a set of visual cues for remembering the Dreamtime stories (Abram 1997, p. 175).

Many writers argue that in oral cultures the dominant sense is hearing, not vision (see for example McLuhan 1967, p. 4). It is not surprising, therefore, to find the critical role of song enhanced by accompanying rhythmic instruments especially in primary oral cultures, those which have no contact at all with writing. Havelock considers primary orality to be a special case:

> The common use of the term "writing" by specialists as applied to any and every form of symbolisation without distinction has helped to blur the boundaries between primary orality, a distinct and separate condition of society ...
>
> … in primary orality, relationships between human beings are governed exclusively by acoustics (supplemented by visual perception of bodily behaviour). The psychology of such relationships is also acoustic. The relation between an individual and his society is acoustic, between himself and his tradition, his law, his government (Havelock 1986, p. 65)

In Western cultures, music is primarily for entertainment. In primary oral cultures, it serves a much broader role. In looking at four groups of contemporary hunter-gatherers from four very different environments on three separate continents, Morley found that the traditional music mostly, if not always, 'constitutes an important repository of knowledge' (2006, p. 103). In fact, Havelock argues that due to the importance of rhythm for memorisation, musical instruments should be considered tools. He writes that it 'would appear that all preliterate cultures employ these resources for assisting the active storage of necessary information' (1978, p. 39).

Although clapping, using hollow logs as a drum or gourds as a rattle will produce the rhythms used to back the oral chants, non-literate societies are known to use a huge range of sophisticated instruments including the Australian Aboriginal didgeridoo and the African *enanga* (zither). The importance of sound in conveying information can be so well developed as to eliminate the need for words. Many African languages are highly tonal so 'drum poetry' has developed where the verbal messages can be sent using the rhythms and changing tones of drums alone. Although known from other contexts, drum poetry is best known from Africa, where it is widespread in the tropical forests. The drums are not accompaniment, nor do they use a pre-arranged code, but transmit the actual words of the poem through rhythm and tone (Finnegan 1977, pp. 98; 119–21; Ong 1977).

The role of dance

Havelock (1963, pp. 148-50) argues that there are three mnemonic techniques used to optimise memory of didactic oral information: verbal techniques, rhythmic instrumental accompaniment and dancing. In oral traditions, dance performs a mnemonic adjunct to the song-poetry (Meyer 1995, p. 26). The elite Ifà cult of the Yoruba in western Nigeria, for example, dance and chant to music provided by sets of bamboo sticks, gongs, bells and drums. The dances are performed meticulously in accord with strict rules of accuracy and precision. They may re-enact sacred or historical events (McClelland 1982, p. 94).

The dances at Australian corroborees often act out the story of a contemporary or mythological event or imitate a successful hunt with wonderfully realistic miming of animals and birds (Flood 2006, p. 50). As a natural history writer, I doubt I could accurately describe details of movement of a kangaroo as it detects an approaching human, despite having observed this behaviour closely for decades. Australian Aboriginal cultures can represent this behaviour in a matter of moments in highly memorable dance. When hunting without firearms, it is essential to get close to prey. Dances can act as a way of reinforcing the hunt strategies to be used and animal behaviour to be expected, as can be seen in videos of Australian Aboriginal dances (Cameron 1993; Graham 2006). This adds depth to the overly simplistic term 'hunting magic', which implies a purely superstitious role for traditional pre-hunt rituals. Dances form an integral part of the information system.

In a film of Aboriginal dances (Cameron 1993), the Woomera Aboriginal Corporation chose to present fourteen dances, along with a narration that referred to them constantly as 'our law' and their role in teaching the culture. Nine of the dances were about animals, of which six also had a clear metaphorical interpretation teaching ethical behaviour. Four of the dances were entirely pragmatic, about making fire, how to hunt and quickly kill a wallaby, the way the sea behaves on the rocks, and how to detect and collect honey.

Like songs, dances are not stagnant forms, but are maintained, adapted or created as serves the needs of the society. Dances can also be introduced from neighbouring cultures. Hamilton A. Tyler describes the performance of the Hilili-Eagle dance, introduced into Zuni from another Pueblo culture, Acoma-Laguna, around 1892. Tyler describes the way various aspects of the dance had been added such that 'a number of elements are slowly gathered to form a new ceremony'. Significantly, he describes the way a 'myth grew up almost immediately to account for parts of this new Zuni dance, which indicates that myths can have secular origin and only acquire religious meaning with later developments' (1979, pp. 75-6). These later developments he describes as involving including the dance in the calendar, which effectively indexes it so it will not be lost. He also notes that it will then be restricted to the control of one of the societies.

The role of story

> "Story" is the basis of American Indian oral tradition. Story is the vehicle for sharing traditional knowledge and passing from one generation to the next. Its purposes include sharing information, providing lessons in morality, confirming identity, and telling experiences of people (Fixico 2003, p. 21-2).

Oral cultures… use stories of human action to store, organise, and communicate much of what they know (Ong 2002, p. 137). A 'story is a sort of natural container for memory; a way of sequencing a set of images, through logical and semantic connections, into a shape which is, in itself, easy to retain in memory. A story is thus a large-scale *aide-mémoire*' (Fentress & Wickham 1992, p. 50).

Abram (1997) claims that anthropologists have tended to view the stories from oral tradition as 'confused attempts at causal explanation by the primitive mind' (1997, p. 119). He argues that, without writing, the stories are essential to preserve the accumulated knowledge of specific plants, animals and the land itself. Pragmatic knowledge needs to be preserved, and modified, in forms which are easily remembered. A simple mental list of the known characteristics of a particular plant or animal, Abram argues, are of no value in an oral culture because they cannot be readily recalled or repeated.

> Without writing, knowledge of the diverse properties of particular animals, plants, and places can be preserved only by being woven into *stories*, into vital tales wherein the specific characteristics of the plant are made evident through a narrated series of events and interactions. … Oral memorisation calls for lively, dynamic, often violent, characters and encounters. If the story carries knowledge about a particular plant or natural element, then that entity will often be cast, like all of the other characters, in a fully animate form, capable of personlike adventures and experiences, susceptible to the kinds of setbacks or difficulties that we know from our own lives. In this manner the character or personality of a medicinal plant will be easily remembered, its poisonous attributes will be readily avoided, and the precise steps in its preparation will be evident from the sequence of events in the very legend that one chants while preparing it (1997, p. 120).

Abram concludes that stories from oral tradition 'which we literates misconstrue as naïve attempt at causal explanation may be recognized as a sophisticated mnemonic method whereby precise knowledge is preserved and passed along from generation to generation' (1997, p. 121). John MacDonald, for example, quotes Inuit Elder, Hubert Amkrualik:

> Stars were well known and they were named so that they could be easily identified whenever it was clear. They were used for directional purposes as well as to tell time…. stars could be remembered by the legends associated with them. The people before us had no writing system so they had legends in order to remember (1998, p. 168).

Conceptual metaphors are pervasive in our conventional language and thinking (Lakoff & Johnson 1980). A great deal of oral tradition, as transcribed, will involve conceptual metaphor. Understanding of the metaphor will be assumed when communicating with members of the culture but may be impenetrable to those outside the culture (Vansina 1985, pp. 86-90). As will be shown in Chapter Seven, the Pueblo cultures use corn pervasively as a metaphor for many aspects of human existence—the colour of the many varieties, growth, the formation of tassels and so on. A very effective kinship model for the inhabitants of Roti, Indonesia, is given in terms of local flora, while the people around Lake Mayi Ndombe, Zaire, use the metaphor of a banana tree plantation (Vansina 1985, p. 138).

Hence, any interpretation of oral tradition and the associated artefacts, without a detailed understanding of the conceptual metaphors used, would be severely limited.

Mythology

A discussion of the many definitions of mythology is clearly beyond the scope of this thesis. However, it is essential to clarify the way in which I will be using the term. Clarke (2003, p. 19) argues that myth is defined in Western European tradition in two contradictory ways: as an invented or fictitious story, the superstitions of 'subordinate cultures', or as a traditional belief with less emphasis on evaluating absolute truth. It is with the second interpretation that I use the term. It is not only Western traditions which distinguish fact from fiction. Both Nunamiut and Tareumiut make a distinction between true histories and imaginary folklore (Minc 1986), a trait also observed with the American Zuni (Tedlock 1972).

Historian of religions, Mircea Eliade, differentiates between 'primitive' myth and the fictional genre, describing myth as 'sacred tradition, primordial revelation, exemplary model' (1964, p. 1). However, Eliade's belief that the 'role and function of these myths can still (or could until very recently) be minutely observed and described by ethnologists' (1964, p. 5) indicates that Eliade, at the time of writing, was unaware of the significance of the corpus of restricted mythology which ethnologists would not have been able to 'minutely observe'. Eliade (1959) makes a firm distinction between the sacred and the profane in all human cultures, a distinction I find at odds with the ethnological research on small-scale oral cultures, which forms the basis of the next four chapters.

This thesis has no conflict with the religious role of myth, as described by theorists such as Eliade. This thesis highlights the pragmatic role of myth and the significance of the dichotomy between public and restricted knowledge, underrepresented in discussions of mythology to date. The encoding of pragmatic information within mythology is known from oral cultures around the world. The myth of the flying canoe in the Trobriand Islands, for

example, contains a recipe for the materials, technology, procedure and social organisation needed for the production of a canoe (Harwood 1976). Mythological characters may act as warnings to avoid dangerous places or acts, such as stories of the 'bunyip' of South-East Australia, who is believed to live in freshwater bodies that are notorious for snags, the base of cliffs and other risky locations. Aboriginal adults across Australia often use frightening actions of spirit beings to ensure children don't wander from the safe confines of the group (Clarke 2003, pp. 22-3; Dixon 1972, p. 30).

Traditional peoples would not have survived had they lived, as so often portrayed, in a fog of superstition and prelogical, irrational thinking. In analysing Zuni narrative, Tedlock (1972, p. 237) argues that oral narrative might better be likened to contemporary science fiction genre. He writes that

> one need not look to modern children's fairy tales, or to modern dreams, or to the concept of a "prelogical mentality" (which still survives, implicitly, in psychoanalytic attempts to treat tales as collective dreams) to understand the fantastic features of oral narratives. The Zunis place their fantasy in the past while we often place it in the future, but that is more a question of where our respective interests lie than of our mental structures.

Goody argues that myths are likely to be recited by specialists in ritual contexts while folktales may be told by adults, but are more likely to be told within families or among groups of children (2010, p. 55). Books full of the child-like folk stories of traditional cultures can be found in every bookshop and library. Goody considers using the conceptual simplifications contained within such stories for the analysis of 'primitive thought' to be akin to using gooseberry bush and stork stories for the analysis of the European concepts of the universe and conception (2010, p. 90). Yet this type of approach has been propounded by influential thinkers. The eminent historian on writing, I. J. Gelb, writes that child psychology is a useful tool for examining 'primitive men' because, it 'has often been observed that the mental attitudes of infants and children sometimes resemble those of societies on the most primitive basis' (1952, p. 21).

Mythology and mnemonics

Research in psychology has shown that imagery is an extremely powerful memory aid Abstract concepts can be tied to images and thus organised into coherent, easy-to-recall sequences of narrative (Ruben 1995, pp. 39-64). Biesele (1986, p. 166) argues that the use of gods and heroes as mnemonic devices, compelling attention and thus memory, is shared by

!Kung and ancient Greek narratives alike, allowing natural phenomena to be made memorable through personified action. Donald (1991, p. 268) writes that, in oral cultures

> the entire scenario of human life gains its perceived importance from myths: decisions are influenced by myth; and the place of every object, animal, plant, and social custom is set in myth. Myth governs the collective mind.

The value of mythology is enhanced by making the mental images as striking as possible with vibrant active, beautiful, hideous, comic or obscene characters in highly emotional events to make the information easier to remember (Yates 1966; Harwood 1976; Bellezza 1996).

Havelock, with his emphasis on ancient Greece, claims that the commonest device for aiding memory in oral cultures is to represent the information ‘as acts and decisions of especially conspicuous agents, namely gods’ (1963, p. 171). Mythology can therefore be considered, in part, as an oral technology, a way by which cultural information can be more reliably stored and transmitted.

Mythology may well arise from historical events, with enhanced mythological characters emerging with time. Vansina (1985, pp. 19-21) relates the emergence of a myth, starting with a historical affray between the Hopi and Navaho which led to a division of land between them. Over the following eighty years, the narration of the events took on characteristics of oral tradition, including mythological characteristics. The event is recalled as an important part of the Hopi history, is told within the oral tradition, and serves to record the location of the border in oral tradition.

In a revealing study, Richard I. Ford presents a detailed analysis of the way multiple varieties of corn are named by hue, and managed through ritual, informed by mythology throughout the Pueblo cultures, including the Tewa speakers. Whether informed by agricultural science or Tewa mythology, the outcome is the same: rigorous management of corn varieties enables survival in a harsh and unpredictable climate. Ford (1980, p. 28) writes:

> From an ecological perspective, plant nomenclature is a component of the information system that regulates behaviour towards plants. In the case of corn, the colour name used to define each type implies a culturally recognized range of hue and the physical management of the corn in order to comply with these expectations. The skills and knowledge required to maintain these corn types include recognition of pollination, spacing of fields, patterning of plant populations, time for maturation, and noninjurious cultivation techniques. If the cognized environment is considered, then attention to pure

> coloured corn is the means to revere or to placate the spirit forces of the Tewa world who would otherwise be offended and bring disaster to the crops and people if fed "mixed up" corn. Pure color corn is a mediating force in the cognized environment. On the other hand, when the operational environment is examined, then the maintenance of named corn types by raising each type in separate and dispersed fields prevents total crop losses in a land of climatic extremes and uncertainty. From both points of view, the application of a particular colour term to maize requires concomitantly an appropriate behavioural sequence for its perpetuation from time immemorial, and verification of a farmer's adherence to tradition is attested to by the condition and success of his corn harvest.

Knowledge is performed

In oral cultures, even pragmatic knowledge is not simply told, but is performed, because performance greatly enhances memorability. Oral performances must be both informative and entertaining to increase the chance of the content being remembered (Finnegan 1988; Gardiner 1996; Havelock 1963; 1986; Ong 1982). The aid to memory is not only for the audience. Research on the mnemonic aid of movement for the performer is staggering. In one study, according to Rubin, '[m]otor enactment of learning increased recall by 165%' (1995, p. 112).

Consequently, written transcripts of oral tradition have lost a great deal of the nature of the tradition (Clunies Ross 1986, p. 251; Gardiner 1996; Ong 2002). For example, in documenting the songs containing extensive knowledge of over 100 plants used by the Australian Yankunytjatjara people, the translator noted that 'in written form the stories lack the performance quality that was so much a part of the way they were told' (Goddard & Kalotas 2002, p. iv).

Not all bodily movement which acts as mnemonic is dance. Nungarrayi (Warlpiri) described walking through country as a 'powerful mnemonic'.

> 'Singing up the country' involves walking and singing the Dreaming, the country tells you and you tell the country. Every rock and undulation and your position in space and time creates your part in the story and your connection with the Dreaming. The iconography represents all of this, onwards into future time and backwards into past time. The song represents the topography as cadences rise and fall, you can feel it in your body. You must use your body to feel it and find it because it cannot exist on a one-dimensional plane (2010, pers. comm., 17 May).

As will be shown in Part Two of this thesis, it is the mnemonic value of walking through country, of walking through a knowledge space, which offers an invaluable insight into the purpose of the avenues and processional walkways so often associated with monumental sites in the early stages of settlement.

The importance of ritual

Anthropologist Roy A. Rappaport defines ritual as ‘a relatively invariant and formal sequence of acts and utterances not encoded by the performers’ (1979, p. 175). Researchers have argued that ritualised behaviours among oral cultures should not be simply dismissed as simplistic superstitious acts (for example see Connerton 1990, pp. 44-45; Goody 1961, p. 143; Turnbull 2002, p. 130). They should *not* be likened to rituals in Western religions, where the secular aspect of the performance is of little importance. Rituals in non-literate cultures need to be considered in terms of their role within those cultures without trying to find an equivalent in literate cultures. Such an equivalent does not exist.

‘Spells’ recited when planting taro in the New Guinea Highlands esoterically encapsulate a range of knowledge pertaining to taro crop cultivation, but are often simply interpreted as ‘ritual’ (Sillitoe 1998, p. 228). In his seminal study of ritual among the New Guinea Tsembaga, Rappaport (1967, pp. 2-4) lists the range of ways in which the ritual is used to maintain environmental balance between cultivated and fallow land, between animal populations–both domesticated and wild–and with the redispersal of people over land and the redistribution of land among territorial groups. ‘Ritual will be regarded here as a mechanism, or set of mechanisms, that regulate some of the relationships of the Tsembaga with components of their environment’ (Rappaport 1967, p. 4).

In a detailed analysis of the corn rituals of the Pueblo Tewa, Richard I. Ford (1980) describes the way that one genera of corn is classified into seven species, and further classified into nine varieties. It is only by mixed planting of various proportions of these varieties that the Tewa optimise corn yields for a variety of purposes in an often harsh and unpredictable climate. Due to the ready cross-pollination of corn, keeping the varieties pure over hundreds of years is a complex science. The information is stored through the mythology of the Corn Mother and Corn Maidens, linked to the various colours of the corn kernels. As will be described in more detail in Chapter Seven, it is through ritual, that the Summer Moiety headman selects the best cobs of corn as the basis for planting and regulates the distribution among the families. Ford concludes that ‘the survival of prehistoric Pueblo population probably depended upon the colours of the corn’ (1980, p. 28).

In small scale, predominantly egalitarian societies, it is difficult for an individual to claim absolute knowledge. Yet the authority of the ritual specialists needs to be exercised if

the members of the culture are to act according to the knowledge handed down from previous generations. It is reasonable to hypothesise that should a culture pay little attention to performing the rituals, the success in hunting, gathering, producing food or surviving through times of resource stress, would be reduced, because of the loss of knowledge embedded within the rituals. Hence experience will have taught previous generations that the performance of rituals is critical. Whether the knowledge content is explicitly recognized, or whether the reason is granted to another agent may not be of consequence to those to whom these rituals are a fundamental aspect of their culture. By sanctifying information in religious ritual, the likelihood that it will be considered an unquestionable truth is increased (Rappaport 1971, pp. 69-72).

The role of ceremony

If people are to come from long distances in order to join other bands or tribes in ceremonies, then it is not surprising to find that these major gatherings serve a multiplicity of purposes. For the purpose of this thesis, it is important to note that ceremonies are one of the main venues for the transmission of pragmatic information, such as the location of water sources and food plants along with the habits and movements of game, through stories, songs and ceremony to enhance the knowledge gained through experience and example (Flood 2004, p. 264). Gatherings also serve the needs of trade, but not only of material goods. As will be explored in Part Two, apparent trade imbalances in prehistoric assemblages at monumental performance sites may reflect that the site is a knowledge centre where knowledge is bought—that is, traded—for material commodities.

Morley (2006) compared four hunter-gatherer groups, on three continents, noting that gatherings included dispute resolution, agreements on laws, performance of mythology, sharing knowledge of plant properties and animal behaviour, as well as knowledge of how, what, when and where to hunt and gather. All gatherings involve multiple purposes, social and spiritual, and all were basically egalitarian, with occasional ritual activities focused on a specialist.

Australian Aboriginal hunter-gatherer bands grouped together into tribes from a few hundred to a few thousand for major gatherings such as a feast, corroboree, a hunt, an initiation or a formal duel (Stanner 1979, pp. 32-3). Morphy (1998, pp. 183-4) describes relatively infrequent complex ritual performances among Australian Aboriginal cultures as ‘often operatic in scale’. The ceremonies consist of the songs, paintings, dances and ritual actions providing the context for acquiring knowledge and reinforcing the Aboriginal relationship to, and responsibility for, the land (Morphy 1991, p. 101; 1998, p. 218; Rose 1992, p. 106). The stories and songs focus on an animal or bird, plant or habitat, weather or

tides, and their seasonal cycle, using mimicry of the sounds and vivid images of the Ancestral Beings so the knowledge will not be forgotten (Attwood & Magowan 2003). Dixon and Koch (1996) describe the corroborees of North-eastern Australian Dyirbal tribes as being led by a singer, usually male, and often describing the behaviour of animals. Drummers, often women, would accompany the clapping of boomerangs by the lead singer while the painted dancers mimed the action of the song. Aboriginal dancers are renowned for their extraordinary ability to accurately mime the movements of native animals. Of 106 Dyirbal corroboree songs analysed, Dixon and Koch found that two thirds dealt with the behaviour of animals, hunting or fishing, or with natural phenomena such as the moon or king tides. A handful of songs related to the behaviour of white people, four or five with an emotional message of happiness or grief, and about twenty related to religious topics, such as how to avoid a particular evil spirit (1996, p. 13).

It is not only mobile cultures which gather bands and tribes together to conduct the business of the society. The sedentary bands of the Narragansett Bay, Rhode Island, for example, used large gatherings to formalise land transfers in ritual. As well as diplomatic exchanges, marriages were also arranged, religious ceremonies performed, gifts traded and tributes offered as a sign and seal of inter-band alliance (Keary 1996, p. 255). Similar levels of complexity and multiplicity of function in ceremonies can be seen in descriptions of the Winnebago Medicine Dance (Radin 1911, p. 153), the Kwakwaka'wakw potlatch (Masco 1995, p. 43) while the East Siberian 'Play the Bear' ritual and feast is part of the mythological repertoire but also serves as a time when marriage arrangements are made (Kwon 1999).

Ceremonial gatherings require that a large number of people be fed, hence seasonal resources may define the timing of the ceremony. For example, the American Lakota pattern of aggregation and dispersal over the annual cycle reflected the seasonal behaviour of the buffalo, their primary subsistence resource (Fixico 2003, p. 44). For Aboriginals in the southeastern Australian highlands, the migration of Bogong moths (*Agrotis infusa*) resulted in up to 14,000 resting on a single square metre of rock wall. This provided a protein feast which sustained huge gatherings of friendly tribes (Flood 2004, p. 2). In Carpentaria, it was the availability of cycad nuts which sustained large groups for ceremonies and dispute-resolution rituals (Bradley 2010, p. 65).

Ceremonial grounds

Although the songs, dances and rituals may not survive beyond the moment, their performance may leave a record in the form of culturally constructed spaces. Many Australian Aboriginal cultures meet for the *bora*, which is primarily an initiation rite. The *bora* involves the construction of ceremonial mounds, circles and arrangements of stones for

the large public gatherings, and smaller areas for initiation where the restricted knowledge is taught. Geometric designs are carved into trees in the area – circles, spirals and concentric lozenges and diamonds, while other objects, designs and sand drawings represent various aspects of the Ancestors and their stories, which are sung, told and taught. Preparation for the bora is complex, taking months and culminating in the gathering of tribes (Flood 2004, pp. 274-5; Isaacs 1984, p. 18; Mathews 1895).

Other ceremonies also require the preparation of ceremonial grounds. In the Djungguwan ceremony of the Yolngu people of northeast Arnhem Land, ceremonial grounds are marked out, songs sung, dances performed and sacred objects manufactured (Graham 2006; Morphy 1991). Various stages of initiation involve the teaching of the knowledge, songs and dances to younger men, some of which can be publicly performed and some of which remains restricted. Mythical ancestors, the Wawilak sisters, are represented by highly decorated posts painted with symbolic representations of the songs. At one level the ceremonial ground physically represents the structure of a beehive, the hovering parasitic bee fly, with details of tracking the bees and collecting the honeycomb (Morphy 1991, p. 129). Feathers used within the ceremony remind those present of the method of attaching a feather or spider's web to a captured bee so as to follow the bee to locate a hive (Yen 2005, p. 379).

The division of ceremonial spaces into public and restricted areas is to be expected. Ceremonies, such as the Yarralin corroborees, involve both restricted and public performance, depending on the knowledge within the songs and dances (Rose 1992, p. 96). Yolngu ceremonies also have public and restricted grounds. For example, most ceremonies have stages that perform publicly in the main camp as well as stages of more restricted access. The revelation of the most sacred objects of a clan and discussion of their significance said to involve only the most senior male members of the clan and related claims, in addition to senior initiates (Morphy 1991, p. 59).

When the purpose of prehistoric monumental sites are considered, as will be argued in Part Two, it is naïve to seek out a single purpose. Ethnographic evidence strongly points to the gatherings serving a multiplicity of purposes, including the trading and performance of pragmatic knowledge, restricted and public, secular and sacred.

A comparison of orality and literacy

This table compares basic communication techniques for oral and literate cultures when conveying the formal knowledge of the culture. It is obviously a simplistic overview but serves to highlight the most significant differences between orality and literacy.

Daily talk is in the natural language of the culture taking a similar form in both literate and non-literate societies.

Communication Trait	**Orality**	**Literacy**
Method of communication	Knowledge is performed.	Knowledge is written.
Ceremonial language	Often ‘archaic’ language is used, with knowledge of the language restricted.	Language for ceremony maybe ‘archaic’ but is not restricted.
Story	The primary purpose of story is to communicate knowledge, with a secondary purpose in entertainment.	The primary purpose is usually entertainment, and sometimes also to communicate knowledge.
Poetry	Verse is primarily didactic.	Verse is primarily entertainment.
Rhythm, rhyme, alliteration	These are an aid to memory of the content of song or verse.	These increase the entertainment value of song or verse.
Music	Music is used as an aid to memory. Rhythm tends to be more important than tune.	Music is primarily entertainment with tune being of significant consequence.
Song	Primary purpose of song is to communicate knowledge, also used for praise. Entertainment is a secondary consideration.	Primary purpose of song is entertainment or for religious praise.
Dance	Primary purpose of dance is to communicate knowledge, with a secondary goal of entertainment.	Primary purpose of dance is entertainment and rarely used to communicate knowledge.

Mythology	The term ‘myth’ is used for stories of beings who are part of the knowledge system, encoding not only spiritual beliefs but pragmatic and social knowledge. They are often believed to be true	The term ‘myth’ is used for non-factual stories which are not believed to be true.
Knowledge domains	All aspects of knowledge tend to be integrated into a single system.	Knowledge tends to be collected into separate domains, with specialists monopolising each domain.
Attainment of knowledge	Formal knowledge is gained through a system of initiation into higher, and ever more restricted, levels of knowledge. Formal initiation ceremonies require ‘examination’ of knowledge imparted in training by a knowledge elite, akin to schooling. The knowledge system is intricately linked with the socio-political system.	Formal knowledge is gained through schooling, with all knowledge taught in educational institutions readily available, but requiring training for understanding. Knowledge becomes highly specialised at higher levels. Restricted knowledge is usually linked to political or financial power, and tends to be distinct from that taught in educational institutions.
Depth of information stored	The amount, and therefore depth, of knowledge which can be retained is limited by fallible human memory.	The amount of knowledge stored is theoretically unlimited as even obscure information on specialist subjects can be written and subsequently used as reference even of stored

		before living memory.
Indexing of information	Indexes are built into the knowledge system to ensure knowledge is not lost, often associated with the physical mnemonic aids used.	Indexes are built into the knowledge system to ensure knowledge is not lost through tables of contents, book indexes, library databases and internet search engines.
Accuracy of recall of information	Accuracy of recall is judged on the current value to the society and adapted accordingly. Unwanted knowledge is forgotten. Knowledge which is forgotten cannot be regained.	Information cannot be adapted as readily once written and disseminated as it can't be changed. Unwanted information is difficult to eliminate. Knowledge which has been lost can be regained if the original written records are found.
Permanent mnemonic aids	Landscape and constructed monuments act as mnemonic with content retained in memory, requiring specific training to be able to recall content. Unfamiliar content cannot be recalled.	Content is contained in the writing on the structures, therefore only training in reading is required to recall content. Unfamiliar content can be read.
Portable mnemonic aids	Inscribed objects are used, in many topologies, with memory of more restricted information aided by abstract motifs.	Written documents and books are sued which tend to have a similar topology for all social groups
Gathering / ceremonial sites	Education and entertainment are served by a single	Educational institutions are segregated from

	location, with a distinct dichotomy between public and restricted performance sites.	entertainment theatres, with no clear dichotomy between public and restricted sites.
Ritual	Ritual behaviour, among many roles, ensures retention of information through constant repetition.	Rituals tend to be associated with religious behaviour or linked to rights of passage.

From ancient cultures to contemporary mnemonists

It is not surprising to find that the artificial memory techniques described above are used by memory specialists in most, if not all, literate and non-literate cultures given that they are optimising the use of the same human memory potential, just in very different social contexts. Contemporary memory champions, known as mnemonists, train their memories for competitions and stage performances. I will refer to the memory methods as described by five of the best known mnemonists: Soviet neuropsychologist, Alexander Romanovich Luria (1968), and memory champions, Dominic O'Brien (2000) and Ed Cooke (2008) who are both British, Norwegian Oddjbörn By (2007) and American Joshua Foer (2011). There is a great deal of overlap between these writers.

All memory experts recommend setting up a 'journey' through sequenced locations to embed any sequenced set of information, as will be explored fully in Chapter Three. Although they all acknowledge that this is the same method as used by the Ancient Greek orators, only Foer acknowledges any link to the use of such mental journeys by oral cultures (2011, p. 97). Abram (1997, p. 270) however, makes exactly that link.

Journeys in space, may be replaced by journeys in time, such as through the ceremonial calendar. Examples include the Kachina Cult of the American Pueblo as will be discussed in Chapter Seven, and the Myth of the Bagre, indexed through the White Bagre.

> Sequence is central to the White Bagre, which consists essentially of an outline and a very partial account of what has to be done at varying intervals in each of the ceremonies to take place (Goody 2010, p. 98).

In memorising sequences of playing cards under competition conditions, mnemonists grant each card a character, much like the characters found in mythology, and then create

sequenced stories for them when a random order of playing cards is to be recalled.

In Appendix A, I have detailed the experiments I have performed over the last three years using the mnemonic techniques of oral cultures, and their equivalent as described by modern mnemonists. I have tested their effectiveness and efficiency in performance contexts, finding them to be far more effective than I could have imagined had I not tried them for myself. Obviously, having developed over centuries, if not millennia, the depth and complexity of oral technologies within oral cultures far exceeds those used within my experiments and by contemporary mnemonists. However, the techniques are based on a common structure to a sufficient degree that an analysis of the effectiveness of these techniques is compelling.

Conclusion

The analysis of mnemonic technologies in this chapter has shown that oral cultures use complex and sophisticated artificial memory techniques, no longer in broad use because the advent of writing takes away our need to commit to memory the knowledge on which our lives and culture depend. When considering the vast store of knowledge maintained by oral cultures, new insights can be found by exploring these knowledge banks using the terminology of information systems.

Artificial memory techniques used across a wide range of oral cultures include aspects of song, dance, story and mythology. Knowledge in oral cultures is performed, not merely spoken. Small ceremonies and large gatherings serve a multiplicity of roles, including to teach, share or trade knowledge in public and restricted contexts. It is for this reason that prehistoric performance sites will be reinterpreted in Part Two in terms of their possible role as knowledge spaces.

Archaeology involves the study of material remains. Most, if not all, oral cultures use material devices as memory aids. In the next chapter, a survey of physical objects used as mnemonic devices in oral cultures will be presented. It is the combination of performance spaces and the material mnemonics as described in the following chapter which will then be used as the basis for the radical interpretations offered in Part Two of this thesis.

Chapter Three – Material mnemonic technologies

Introduction

With the vast accumulation of stories, songs, myths and dances used within a single culture, and only the fallible human memory to store them, a combination of oral and material devices optimises the chance of reliable recall. A physical device may act as an index—a table of contents, a set of subheadings—to the knowledge elements. For example, the Navajo story of the Twelve Months of the year and associated Calendar Stone (O'Bryan 1993) act as a combined memory aid to the natural events and ceremonies to be performed over the year. Each month has a number of items listed, about each there is much more detail stored in separate chants and ceremonies. The knowledge system is multi-layered and formally structured. As Vansina (1985) lists items such as knots in a rope, notches on a stick and bundles of objects and the landscape as mnemonic technologies with a role in sequencing information, 'it is not surprising to find that when precision recall is desired, many [oral] peoples have turned to mnemotechnic devices' (1985, p. 44). He concludes that the use of mnemotechnic devices 'seems to have been a common practice all over the world' (1985, p. 45).

Under the heading 'proto-writing'[6] Goody (1987, pp. 8-18) reviews a number of devices including pictographic images such as the birchbark scrolls of the Ojibwa, the winter counts of the Dakota and the Australian *churinga*, all discussed below. Goody concludes that these mnemonic devices are used to

> record or identify the words of the song, the accounts of an individual, the event of the year. They maybe abstract or pictorial, and are 'signs' of the sequential kind. However they are not transcripts of language, but rather a figurative shorthand, a mnemonic, which attempts to recall or prompt linguistic statements rather than to reproduce them (1987, p. 17).

[6] The definition of writing is the subject of debate and is, unfortunately, beyond the scope of this thesis. This thesis follows Diringer (1962, pp. 22-4) in distinguishing between ideograms and phonetic writing. Diringer writes that ideograms, in which symbols represent ideas, have been found among many indigenous people across the world. Although he uses the term 'ideographic writing,' he notes that there is no connection between the symbol and the spoken word, thus the symbols can be read in any language. Phonetic writing, however, is 'the graphic counterpart of speech' (1962, p. 23), which may be either syllabic or alphabetic. As cultures using ideograms still use the oral technologies addressed in this thesis, they are included here as 'oral cultures'. Those referred to as 'literate cultures' are those which use a phonetic script of some form to record the knowledge of the culture.

Brokaw argues that the development of some form of secondary medium is universal but the implementation is culturally specific, depending on the 'the particular way in which knowledge and power are controlled and distributed in the society under question' (2010, p. 37). Gardiner (1996, p. 4) refers to 'a wide range of inscriptive devices and physical materials to preserve and communicate important aspect of social, religious and cultural life' including 'poles and structures, sacred sites and objects of various kinds, cave and bark paintings'. Turnbull (2000, p. 153) describes the widespread use of 'material models of systems, like stick charts and stone arrangements' associated with 'constant repetition of practice until the knowledge becomes completely tacit – an unreflective skill'.

These writers are the exceptions—the vast majority of the relevant scholarly literature refer to enigmatic decorated objects found within traditional cultures as 'ritual' or 'magical' or 'religious' without exploring any possible mnemonic purpose. It is not surprising, therefore, to find that there is no classification of mnemonic devices widely used by oral cultures to enable ethnographers and archaeologists to consider this role in interpretation of enigmatic objects they may encounter. This chapter will provide just such a classification.

The groups of objects selected for inclusion in this chapter are those which display a morphology which is widespread and readily adaptable, involving a rationality and simplicity for structuring the knowledge such that parallel implementation by a range of cultures offers no surprise at all. For each of these morphologies, I have created my own version, using it to act as mnemonic to information relevant to a modern Western culture. In this way, I was able to experience just how effective these mnemonic technologies are. The details of these experiments can be found in Appendix A.

Organisational and encoding mnemonics

Mnemonic devices are divided into two broad categories by Bellezza (1996, p. 347). *Organisational mnemonics* use a set of mental cues, such as a set of memory locations, to which information can be associated. The Method of Loci, discussed in detail below, is the classic organisational mnemonic technology. *Encoding mnemonics* are created by forming information in memorable formats which are then associated with the organisational structures. Bellezza refers to 'bizarre, ridiculous, and fantastic associations that do not represent actual events' (1996, p. 365) which are used to help remember material that is low in imagery and meaning. The combination of material devices and vivid mythology produces a structured knowledge system enabling information to be more reliably recalled.

Organisational mnemonic technologies can be broadly divided into those which are non-portable fixtures in the landscape, and portable devices which can travel with memory

specialists in both mobile and sedentary cultures. It is the organisational mnemonic technologies which will leave an archaeological record, as discussed in Part Two, while the encoding mnemonics are lost.

Non-portable organisational mnemonic technologies

Landscape as mnemonic

Oral cultures use natural and cultural markers in the landscape as sequenced mnemonic locations. American Indian, Donald Fixico describes the sacred landscape sites as 'touchstones for memory' (2003, p. 25). Well-defined paths through the landscape effectively order the knowledge and act as constant mnemonic to it, while reflecting the seasonal patterns of movement (Abram 1997; Ruggles 1999; Tilley 1994). There can be no more permanent way of fixing the sequence, of ordering and indexing a knowledge system. It is not surprising, therefore, to find linking oral tradition to rocks, streams, rivers, oxbow lakes, hills, cliffs, trees and other natural features in a wide variety of cultures around the world (for example see Bradley 2000; Calado, 2002, p. 23; Harwood, 1976; Helskog, 2004, p. 269-70; Tacon 1999; Weiner 2002). Cognitive psychologist, David C. Ruben (1995, p. 39), argues that the ballads and epics in typical oral tradition involve a shift to a new location every stanza or two providing a spatial path to the storyline ensuring that items are not lost.

Vansina writes that the African 'landscape, changed by man or not, was often a powerful mnemonic device' (1985, p. 45). For Australia's contemporary Aboriginal cultures, it still is because, as Morphy writes, the 'landscape created by mythological actions is the ultimate medium for encoding mythological events and does so almost by definition through ordering them in space' (1991, p. 237).

Characteristics of the landscape, either human-made or natural, are commonly used as mnemonic sites (Schmidt 2006, p. 81) as has been recorded for the Hai||om Bush People (Turnbull 2002, p. 137), the Haya of northwestern Tanzania (Schmidt 2004), the Arctic Nenets (Ovsyannikov & Terebikhin 1994, p. 59), the Ojibwa of North America (Rajnovich 1994; Vennum 1978), the Saami of Finland (Bradley 2000, p. 5), the north-west Alaskan Koyukon (Tilley 1994, pp. 56-7), the Luapula of East Africa and the Zuni of south-western America (Harwood, 1976). Landscapes become knowledge maps, such as 'the semantic fields of paths on the island of Belau' (Tilley 1994, p. 30).

Mobile Australian Aboriginal cultures move between seasonal food sources over the year. Australian anthropologist, Howard Morphy, writes,

As the ancestral beings journeyed across the earth they therefore made a record of their

> actions not only in the form of the landscape, but also in the songs, dances, paintings, ceremonies and sacred objects that they created on the way (1998, p. 84).

Throughout this travelled landscape are sacred memorials—sacred sites—associated with pathways tracing the movements of Ancestral Beings as they created the landscape. In central Australian cultures, every song and every rite is tied to one particular sacred site within the landscape (Strehlow 1971, p. xvi). Clarke describes travelling with Elders in the Simpson Desert,

> where it appeared that every prominent sand dune, rock outcrop, soakage and large tree had some specific mythological relevance to the Muramura Ancestors, whose Dreaming Tracks crisscrossed the country. Their descriptions of the hundreds of places within this landscape made it alive with cultural and social relevance (2003, pp. 18-19).

Songlines index the landscape

Bruce Chatwin brought the navigational aspect of dreaming tracks, or songlines, to public notice with his book, *The Songlines* (Chatwin 1988). But songlines are far more than the navigational aids he described. Each location acts as a subheading to the knowledge associated with the songs of the particular sacred site. John Bradley (2008) documents one singing track of Yanyuwa elders which tells of stone tool technology, names of the land, people, winds, seasonal events, objects, the correct way to hunt and forage, process food and make tools, along with various groups' rights to the land. When they arrived at the quarry site at Kal-kaji, Jerry Ngarn-awak-ajarra sung verses that told of stone tool technology matching the flakes scattered at the location, describing a technology which had not been used for 100 years. Ngarn-awak-ajarra had last travelled there over fifty years before.

The songlines act as an index to the songs, and thus to the knowledge of the culture. Embedding the knowledge within a sequential information system, grounded in the landscape itself, ensures that knowledge is not lost. John Bradley has mapped over 800 km of songlines in a three decade long association with the Yanyuwa people of Carpentaria (2010, p. 43). Through transcripts of the songlines, the *kujika,* it is possible to gain an idea of the way song, movement and knowledge of animals, plants and the environment are all intertwined with navigating the landscape, as this short extract shows:

> This is the way we are following the kujika. We are singing the high bank at Marrinybul, we are singing down and we are ascending. This way to the east we are getting her–the Crow Dreaming–then back to the west a short way. We are following

> and we are singing the Wedge-tailed Eagle. All right, a short way to the south and we are finishing; we are putting that kujika down: the Wedge-tailed Eagle and Crow–we're putting them down. They remain there at Marrinybul: we are putting that kujika down into the depths of the water at a place called Marrinybul (2010, p. 43).

Bradley emphasises that kujika have both public and restricted forms. He writes that 'the public kujika is a thick description–a very detailed vision of the country–its geography and the plant, animal species, phenomena and objects one might encounter in it' (2010, p. 47). These landscape places are also linked to other forms of oral and material mnemonic.

Probably the most easily visualised mythological landscape is that which encircles the massive natural monolith, Uluru, in central Australia. Uluru is part of what the Anangu traditional owners describe as the landscape of the Ancestors and upholds *Tjuk-urpa* which they define as 'the history, knowledge, religion, morality and law' (Australian Government 2011). Anangu rock art and body paintings are created for teaching and storytelling. Specific meanings of the concentric circles, animal tracks and outlines of animals are only revealed when the story of the painting is told—a concentric circle may mean a waterhole, camping place, honey ant nest, or native fig depending on the site and story (Australian Government 2011).

Australian anthropologist, Charles Mountford, described how almost every feature on the surface of Uluru (at that time referred to as Ayers Rock), is named, acting as a mnemonic for mythological story (Mountford 1977; Tilley 1994, pp. 43-47). Lévi-Strauss refers to the Uluru example as serving to illustrate the structure of the myth and the order of ceremonies, and then argues that examples of a similar mythical geography can be identified for many cultures in North America and in the Sudan (1966, pp. 165-6).

Figure 3.1 Uluru from the air. Photograph: Leonard G. Used with permission.

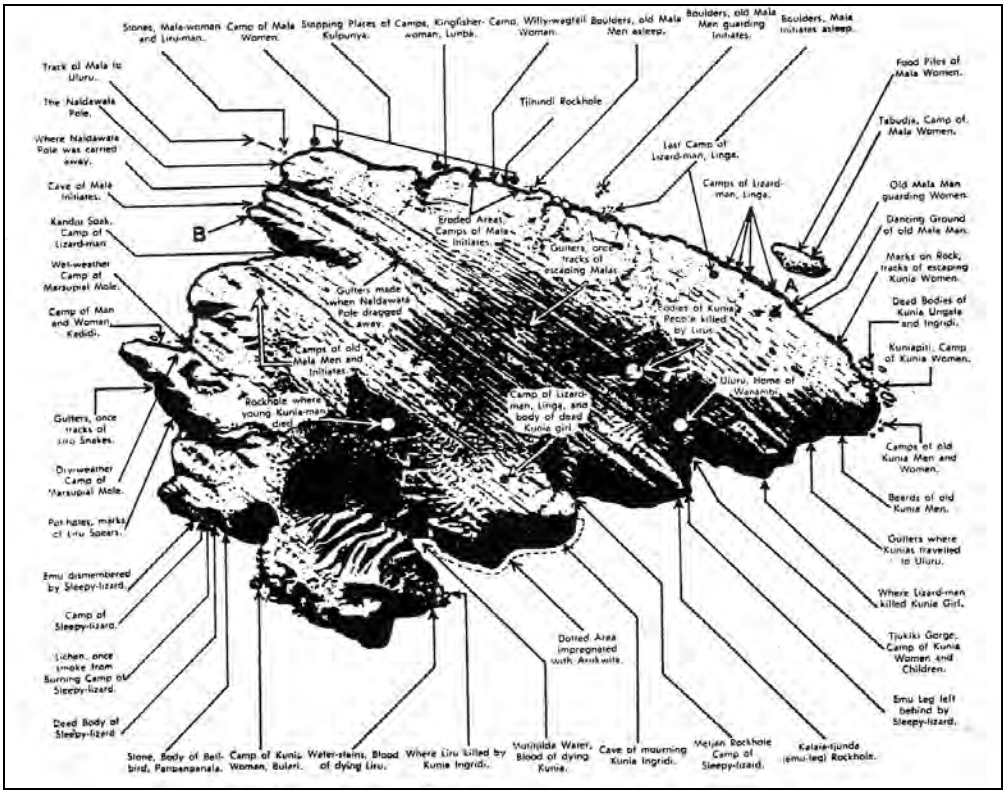

Figure 3.2 Uluru as a set of sacred sites as in Mountford (1972, p. 32). Permission sought.

Tacon argues that the socialisation of the significant landscape sites is a global phenomenon. He argues that people move through different levels of knowledge acquisition as they gain access, through initiation, to more sacred sites. ‘This process began with natural places but continues with sacred architecture across the globe’ (1999, p. 42). The imperative is to perform the ceremonies, to repeat the knowledge, to retain the information and to ensure, through a sequence of material mnemonic sites, that no critical part of the knowledge system was neglected. Examples of something akin to the Australian songlines can be found in the Native American trails and Incan ceques (Turnbull 2007, p. 142).

Turnbull uses the term ‘knowledge spaces’ (2000, p. 20) to describe the way heterogeneous components of oral knowledge systems are linked. An acceptance of the universality of using the landscape as a knowledge space acquisition begs the question: what do mobile cultures do when they first settle and no longer visit a range of sites as they move around the landscape? How do they retain a sequenced information system? Part Two of this thesis will argue that prehistoric cultures, on the cusp of settlement, constructed stone and timber circles, mounds and monuments to create their knowledge spaces.

As societies remain in a smaller geographic area, the need for artificial knowledge sites becomes imperative. For example, the great road, Ara Metua, on the Polynesian island of Rarotonga, was structured and restructured over time in its use as a spatial mnemonic (Campbell 2006). Ara Metua was primarily used as a road, for movement of people to exchange goods and information. But it also served as a mnemonic for the oral tradition as ritual processions along the road replicated the route of Tangi’ia Nui, credited through oral tradition as the founder of the culture. The Ara Metua represent a memorial practice which relies on repetition, ritual and integration into daily life. Campbell notes that the road, and the associated memories, can be strategically employed by the Rarotongan elite to reinforce the socio-political powers.

The separation of knowledge spaces from habitation sites is also widespread. For example, Harwood (1976) describes the myth of the flying canoe in the Trobriand Islands as taking place at Monikiniki on the island of Kitava, away from the domestic site, and contains a recipe for the materials, technology, procedure and social organisation needed for the production of a canoe. The landscape holds an index for the song-poetry which underpins the oral tradition, where mythology is linked to landscape sites which are usually isolated places, or, when close to habitation, kept separate using vegetation.

Embedding the knowledge system within a sequential set of locations ensures that sections of the knowledge are not lost, while giving a memory aid to the content. The most famous use of architecture as a set of mnemonic locations belongs to the pre-literate Greeks.

The Method of Loci

The 'Method of Loci' or 'Art Of Memory' is described in detail in Yates (1966) as a technique for using physical places to memorise long pieces of prose. Pre-literate Greek orators used a streetscape or building in which to hold the series of invented mnemonic images and could then replicate them just by imagining themselves walking through that space, giving not only the content but the sequence (Fentress & Wickham 1992, p. 11; Yates 1966). The *Illiad* may have been aided by some form of writing, but it is recorded that Homer could recite it from memory, all 16,000 verses which would have taken at least four long evenings to recite. Homer used the Method of Loci (O'Brien, 2000).

Breaking up the speech into memorable sections, the narrator walks around the physical space, allocating each part of the speech to a given location (loci). Yates (1966, pp. 4-9) quotes the ancient Greek textbook for orators, *Ad Herennium* (circa 86-82 BC). The set of locations, the orators are advised, must be in a definite sequence, should be in a location away from distracting passers-by, well lit, and not too much like one another, of moderate size, with a moderate distance between them. The *Ad Herennium* also suggests that mental images should be as striking as possible with vibrant active characters in order to be the most memorable. Exceptional beauty or singular ugliness, striking or comic effects, heroes and trauma, disasters and great feats—all make the story easier to remember. Active and highly emotive myths with exaggerated characters and monstrous creatures, part human part beast, say, make the story much easier to remember (Bellezza, 1996; Harwood 1976; Rubin 1995, p. 55).

Russian clinical psychologist Aleksandr Romanovich Luria (1968) details the study of a man who, using what is effectively the Method of Loci, demonstrated his extraordinary memory for lists, details, mathematical formulae, tables of numbers or letters and even poetry in languages he didn't speak. Years later, given the correct trigger of location, the mnemonist could recall a table of random numbers reliably. Eight times world memory champion, Dominic O'Brien, developed the same technique independently, claiming his powers of concentration were greatly enhanced along with his memory. He still uses what he called 'the journey method' as he has found nothing better (O'Brien, 2000).

It is often claimed, as O'Brien does (2000, p. 16), that the Greeks invented the Method of Loci. One of the leading authorities on primary orality, Jack Goody, specifically made this claim:

> Let me put the problem in another way. If verbatim learning worldwide spreading oral cultures, we would expect to find developed there a number of mnemotechnical devices

> of the sort described by Francis Yates in her well-known book on the [sic] *The Art of Memory* (1966). Certainly mnemonic devices were available to pre-literate cultures, though the repeated recourse to the quipu of the Inca as an example might suggest that these were not so common as is sometimes supposed. But, more significantly, the elaborate systems discussed by Yates, appear to have been invented by a literate society. "Few people know" writes Yates, "that the Greeks, who invented many arts, invented an art of memory which, like the other arts, was passed on to Rome whence it descended in the European tradition" (1966, p. xi) (Goody 1987, p. 180).

I do not dispute Goody's conclusions that verbatim learning is not widespread in oral cultures. I, too, have found that the quipu is referred to constantly, while discussion of other mnemonic devices is difficult to find. This chapter will present a wide variety of mnemonic devices and argue that these are in fact found in most, if not all, non-literate cultures. Where I disagree very strongly with Jack Goody is that the art of memory is not found within non-literate cultures. I can find no difference between the art of memory, as described by Yates, and the methods used by indigenous cultures without buildings, using natural or cultural locations within landscape as mnemonic to ceremony, and therefore to knowledge. Nor am I the first to say so. Abram (1997, p. 270) argues that Australian Aboriginal songlines are a form of the Method of Loci.

Describing the way in which Antikirinja women of Central Australia perform the songs related to the songlines which traverse a large tract of country, Ellis and Barwick (1989) note that, although the songs were very closely linked to sites within the landscape, the performers did not feel the need to be at the actual location in order to perform the associated ceremony. This is totally in keeping with the way in which the Method of Loci functioned in ancient Greece, and continues to function for modern mnemonists. It is evident from Bradley (2010) that exactly the same is true of the Yanyuwa men and women's knowledge, structured through songlines.

Goody goes on to argue that the Art of Memory is associated with writing for two reasons, firstly, the insistence upon order, and secondly, that 'schooling and writing are inextricably linked from the very beginning of both' (1987, p. 182). As is shown in Chapter Two, oral tradition is indexed, is sequenced–it forms an ordered information system. As I have shown in Chapter One, the link between schooling and literacy is strongly disputed, with much evidence to support the claim that formal schooling occurs in non-literate societies.

It seems apparent that all the cultures using movement from sacred place to sacred place throughout the landscape, each location associated with knowledge, are using the Method of Loci. It is therefore logical to conclude that the non-literate cultures who built the

monumental sites in the early stages of settlement, such as the stone circles of Neolithic Europe, also used the Method of Loci. This simple conclusion leads to radical new interpretations of these archaeological sites, as will be shown in Part Two of this thesis.

The role of art

The creative products of non-literate cultures should not be viewed as 'primitive art' but, as this section will argue, serve a primary purpose as mnemonic to the knowledge system. Is the aesthetic, so valued by Western collectors, the primary motivation for those who created them? Not so long ago, highly respected Western writers viewed 'primitive art', as is the title of Franz Boas' influential work, as a leisure pursuit. 'We recognize in a study of the art products of each people that the amount they produce is in direct relation to the amount of their leisure' (Boas 1953, p. 300). This is not a view which could be supported by researchers with an intimate knowledge of the culture whose art they are exploring.

Robert and Roberts (2007) draw on extensive African art history research to argue that the primary purpose of Luba works of art is 'to generate memory through oral recitation, dance, song and trance as people negotiate and *make* histories to justify particular politics' (2007, p. 16). Many researchers argue that art is mnemonic for knowledge, and not simply aesthetic nor representational (for example, see Berndt and Berndt 1957, p. 12; Gardiner 1996, pp. 9-10).

'For Australian Aboriginal people, art is never primarily for aesthetics. It is always to help remember Country, the stories and the knowledge' (Nungarrayi 2010, pers. comm., 29 November). In describing the Yirrkala bark paintings, Djon Mundine writes:

> Aboriginal bark paintings are more than just ochres on bark: they represent a social history; an encyclopaedia of the environment; a place; a site; a season; a being; a song; a dance; a ritual; an ancestral story and a personal history (Buku-Larrngay Mulka Centre 1999).

Australian Aboriginal carvings include representational figures of animals and humans, but also a large proportion of geometric motifs: circles, spirals, arcs, lines, dots and animal tracks (Hiscock 2008; Morwood 2002). Abstract designs may not only represent the animals themselves but also animal tracks, nests, burrows and methods to exploit the resource, such as how to dig the nests of honey ants (Morphy 1998, pp. 111-13). Analysis of Central Australian styles and techniques indicate that the engravings are 'part of an art tradition extending back into the Pleistocene' (Morwood 2003, p. 40).

In many cultures, traditional art objects are used as memory aids for formal training.

Often they are highly restricted objects, so little is known of them or little can be told. The degree of knowledge available to outsiders depends on the status of the contemporary culture. For example, use of the Australian *tjuringa* is still active, and hence the *tjuring*a is still highly restricted. A photograph of an African Luba lukasa, say, can be included here without giving offence (as in Roberts & Roberts 2007), but although there are photographs of *tjuringa* in the public domain, this is without the permission of the traditional owners and offensive to them, hence it would be culturally inappropriate to reproduce one of those photographs. Every attempt at cultural sensitivity has been made in presenting this chapter.

Art reflects the public and restricted dichotomy

Abstract symbols provide a way of allowing many different interpretations. Howard Morphy, talking about Central Australian art, argues that the ability to associate a small range of symbols offers the possibility of a wide range of meanings (Morphy 1998, p. 114) even within a single painting (Morphy 1991, p. 265; Tacon 1999, p. 48). Morphy describes the high proportion of geometric elements as being able to refer to pragmatic information such as the topography of the landscape or the identity of the social group owning the design but argues that 'their most significant characteristic is that they have the capacity to encode a multiplicity of meanings' (1998, p. 97). Morwood writes that 'secret and sacred art is almost exclusively made up of geometric designs and tracks, while art in secular, domestic situations places more emphasis on figurative motifs (2003, p. 41).

Abstract designs serve the purpose of restricting knowledge to those who are initiated. Greater depth in the understanding of the images can be provided through training into the higher levels of knowledge.

> The meaning of Aboriginal rock art varies according to who is interpreting and to whom they are interpreting, with access to various levels of meaning dependent on sex, age, status, knowledge of tradition, contexts of initiation and other factors (Tacon 2008, p. 173).

The restrictive nature of esoteric images is reported from cultures around the world. For example, Rajnovich (1994) describes Ojibway pictographs as non-representative with each standing for a single song and deliberately obscured to exclude the uninitiated, while also providing several levels of meaning. Mnemonic pictography in much of North America also involved graphic notations that were deliberately esoteric to ensure their understanding was only for initiates (Houston 2004, pp. 224-6).

Poles and posts as mnemonic

Oral cultures erect poles or posts, usually associated with ceremonial grounds. Given that a carved pole is such a dramatic and semi-permanent way of representing oral tradition, it is not surprising to find this use of posts documented for cultures around the world. Images are presented sequentially, up or down the pole, enabling an ordered recall of the songs and stories associated with the information.

The most easily recognised decorated posts are the totem poles of the indigenous peoples of the Pacific Northwest Coast. Many of the American Indian and Canadian First People's totem poles act as a memory guide to the oral tradition (Swanton 1906; Wright 2008). Also well documented are mortuary poles, representations of genealogies and of totems. Garfield and Forest (1961) describe the way southeast Alaskan totem poles encode knowledge, such as the behaviour of terrestrial and marine animals. The stories associated with totem poles are owned, and thus some are restricted. Posts might tell of the restrictions on rights to specific hunting grounds or how to construct a bow and arrow safely, and how to best hunt with it.

The Tlingit, from the Pacific Northwest Coast of America and Canada, carved a public pole which represents the story of Raven, who, with the frog as his guide, visited the ocean and learned about each of the marine animals and how to utilise the food provided by the sea. Raven was then charged with the responsibility of teaching the Tlingit. Also indicated on their poles could be symbolic reminders of resource rights, quarrels, murders, debts as well as harrowing events in the recent history of the tribe. At feasts, or potlatches, costumed Tlingit performers sing the histories and mythological events symbolised on a totem pole. These ceremonies were critical to encoding knowledge into the oral tradition and reinforcing the ability of the hereditary class to remember it (Garfield & Forest, 1961, pp. 1-9).

Figure 3.3a Totem poles and totem characters, Peabody Museum of Archaeology and Ethnology, Harvard. Photographs: Lynne Kelly.

Figure 3.3b Totem pole, Totem Park, Victoria, British Columbia, Canada. Photograph: public domain.

Decorated poles are known within a wide variety of cultures, such as the Australian Yolngu (Morphy 1991, p. 120), the Inuit (Brokaw 2010, p. 8) and in New Guinea, as shown below.

Figure 3.4 Sarah Chinnery. Five men each holding a carved totem pole, New Guinea, ca. 1936 Sarah Chinnery photographic collection of New Guinea, England and Australia 1900-2002. nla.pic-vn4554737. National Library of Australia. Published with permission.

Portable organisational mnemonic technologies

Many portable objects, inscribed or not, are used by contemporary or documented oral cultures to aid memory. Although often seen purely as 'ritual objects', no more than a tool for superstition, a more thorough reading often shows a great deal more complex purpose. For example, I have seen many references to the Yoruba of West Africa using cowrie shells for divination. This activity is referred to in terms akin to new age divination in modern times. As will be shown below, a close reading of the definitive text on the practice (Bascom 1980) shows a complex knowledge system using the fall of the cowries to index the restricted knowledge hidden behind the public divination practice.

The following section groups similar portable mnemonic systems found in oral cultures around the world to give an overview of the range of methods used. In any given

culture, however, a range of material mnemonic devices will be used concurrently. In several traditional societies in southern Nigeria, for example, mnemonic devices include cords, beads, strings, amulets, tattoos, war and hunting trophies, erected structures, trees, marks on walls and pots (Keibel, 1990). In all cases, the objects are part of a broader set of material and oral mnemonics which serve to encode the pragmatic and scientific knowledge along with the historical and religious.

Pictographic and geometric representations

Gelb illustrates a wide range of pictographic forms from North American, South American and African cultures, under the heading of 'identifying-mnemonic devices' (1952, pp. 24-59), describing a number of these as memory aids for songs and proverbs. Examples include winter counts and birchbark scrolls.

Winter counts

Winter counts are maintained by various language groups within the North American Indian cultures. The annual cycle is taken from the time of the first snowfall of the winter. One significant event from the previous year is added to the pictographic collection to act as a mnemonic to the history of the tribe for that year. Other events, such as births, marriages and socio-political occurrences, are stored in stories linked to the event depicted. The winter count acts as mnemonic to the oral history, enabling both content and sequence to be recorded (Krupat 1998). The Sioux winter count was recorded on buffalo skin (Vansina 1985). Elders met each year to decide which event would be depicted. For example, the 1833 record on Lone Dog's Winter Count created by the Nakota, one of the Sioux language groups, depicted the Leonid Meteor Storm while 1852 depicted the Nakota making peace with the Crow Indians (Schupman & O'Flahavan n.d.).

Figure 3.5 Lone Dog's Winter Count, Nakota. National Museum of the American Indian. Image with permission American Government.

Winter counts were also produced on other materials, in wood, such as by the Tohono O'odham Nation and bone as incised by Arctic Eskimo cultures.

Figure 3.6 Calendar stick, noting events between 1831 and 1939, Tohono O'odham Nation, North America, Smithsonian Museum of the American Indian. Photograph: Lynne Kelly.

Figure 3.7 Arctic Eskimo winter counts on bone, Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

Figure 3.8 Arctic Eskimo winter counts on bone, underside of above. Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

Birchbark scrolls

The oral specialists, the *Midéwewin* of the Ojibwa(y), also referred to as the Chippewa(y), of North America used inscribed scrolls made of bark from birch trees to aid the recall of the origin-migration songs which form the basis of their oral tradition. Ojibwa pictographs were often non-representative, each standing for a single song, deliberately obscured to exclude the uninitiated but also to add power to the song by providing several levels of meaning (Rajnovich 1994). The function of the birchbark scrolls was always mnemonic (Goody 1987, p. 14). The scrolls also had marks for changes in rhythm, tempo and the divisions between song sequences for the performance, which was accompanied by drums and rattles. The Obijwa used carved trees within their Medicine Lodges, as well as large sacred stones as part of the training (Rajnovich 1994; Vennum 1978) although the training in the complex rituals was done almost exclusively through the inscriptions on the birchbark scrolls (Dewdney 1975, p. 13). Goody writes that an individual became a pupil of a senior member of the society and handed over a significant payment in exchange for teaching on how to read the scrolls, which he describes as secret documents meant to act as a mnemonic for the initiate, not for communicating public information (1987, p. 14).

Figure 3.9 Birchbark prepared for inscription. Museum of the American Indian, Washington. Photograph: Lynne Kelly.

Figure 3.10 Inscribed birch bark. Peabody Museum of Archaeology and Ethnology, Harvard University. Photograph: Lynne Kelly.

Figure 3.11 Inscribed birch bark – detail of above. Peabody Museum of Archaeology and Ethnology, Harvard University. Photograph: Lynne Kelly.

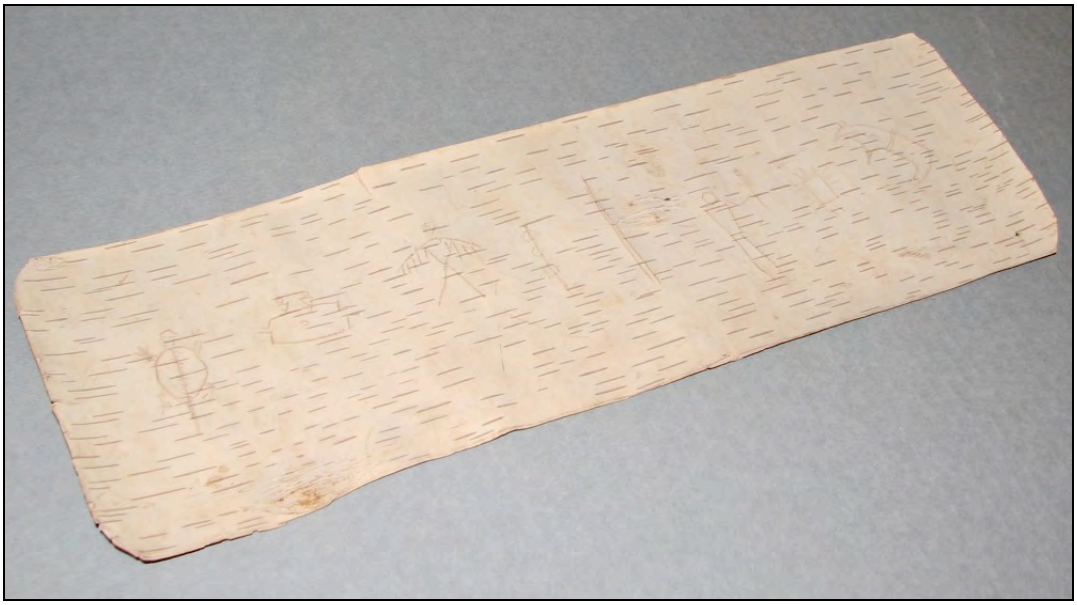

Figure 3.12 Inscribed birch bark, Scroll for first level initiate. Peabody Museum of Archaeology and Ethnology, Harvard University. Photograph: Lynne Kelly.

Figure 3.13 Inscribed birch bark scroll being unwound at the Peabody Museum of Archaeology and Ethnology, Harvard University. Photograph: Lynne Kelly.

Song boards

Very similar to the birchbark scrolls are songboards, inscribed wooden boards used to aid memory of songs during performance. The Native American Winnebago (now known as the Ho-Chunk) initiated men, women and children into the Dance Society, a critical part of their role being knowledge of the songs and rituals, and being able to recite the myths within the ceremonies (Radin1911, p. 151). An elaborately carved Winnebago song board, such as that found in the Peabody Museum of Archaeology and Ethnology at Harvard, acts as mnemonic to these songs.

Figure 3.14 Winnebago song board. Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

It is also claimed that some of the notched sticks of the American Winnebago were used to maintain a calendar (Marshack1985) while a notched stick was used to count songs performed at a feast, often numbering in the order of 700, by the Evenki of Siberia (Hayden & Vileneuvre 2011, p. 349)

Churinga / Tjurunga

Similar again to the birchbark scrolls and the song boards of sedentary Native American cultures, are the churinga of the mobile Australian Desert cultures. Flood refers to ‘churinga’ or ‘tjuringa’ as ‘the most secret sacred Australian artefacts’ (2006, p. 151). Rogers (1977) describes churinga as usually elongated, flat pieces of wood or stone varying in length from about 20 centimetres long to over 2 metres, incised with geometric designs. He writes that sacred tjuringa and bull-roarers from the Western and Central Desert Australian language groups show a wide range of geometric designs representing navigational paths, campsites, animal tracks, plants and totems. Patterning includes multiple lines, zigzags, concentric circles, dots, double grooves, U-shapes, animal tracks, small arcs (representing witchetty grubs) and concentric circles (representing honey ants), all combined in a sacred design. Tjuringa are restricted objects, seen only by initiated men. Many tjuringa would be set up at

sacred places, such as remote caves, along the lengthy journey to inter-tribal ceremonial grounds. Strehlow notes that among the Western and Northern Aranda, one of the proudest moments in the life of a young man used to be the occasion when he was shown his personal tjurunga (1971, p. 391).

Although there are many photographs of churinga on the internet, indigenous Australians told me that it would be inappropriate to include a photograph in this thesis. However, staff at the Ngarn-gi Bagora Indigenous Centre at La Trobe University felt that it would not be offensive to include the sketches of churinga shown in Rogers (1977, p. 15).

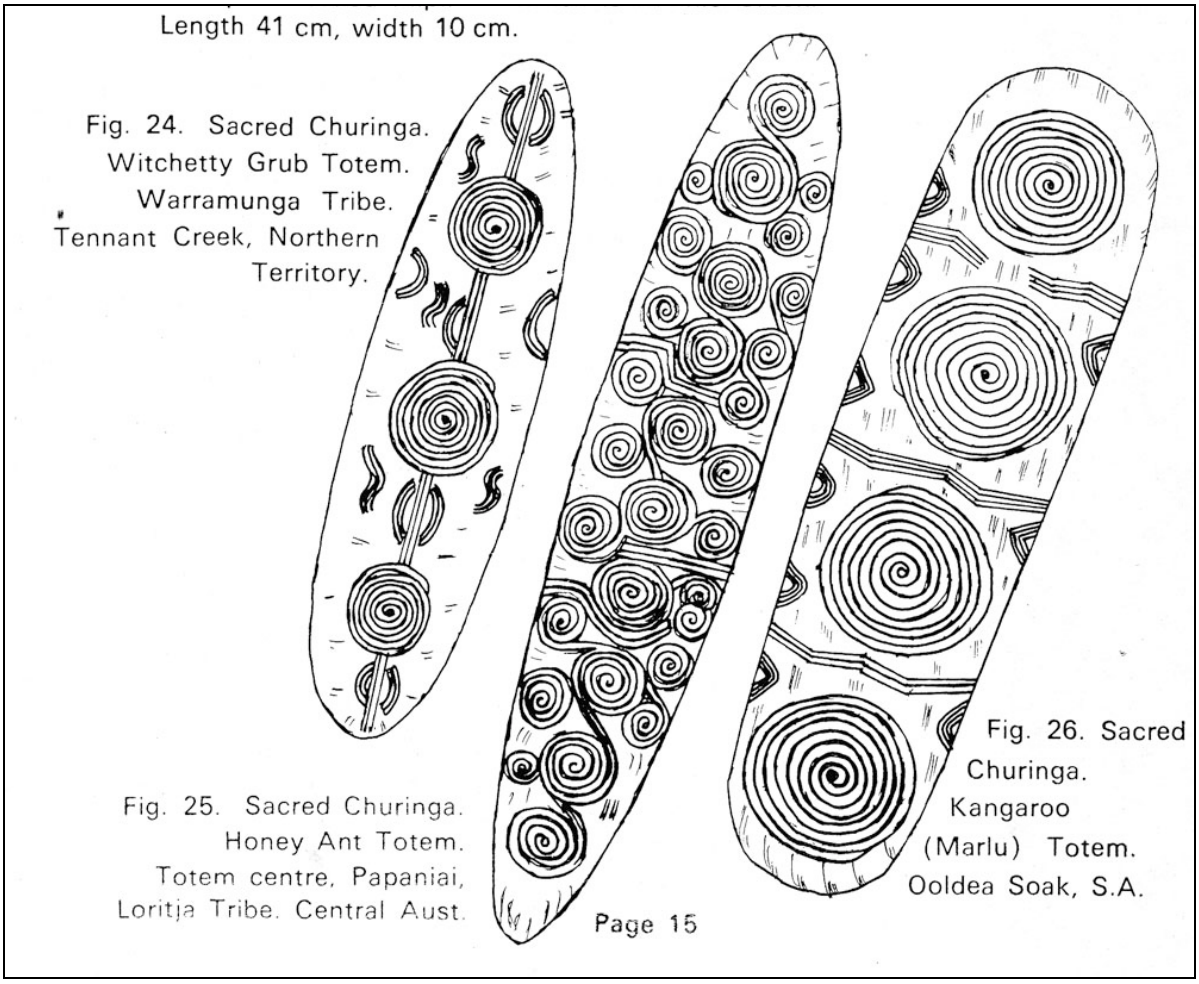

Figure 3.15 Sacred churinga designs, from Rogers (1977, p. 15) Aboriginal decorative art on sacred churinga and bull-roarers, *Central North Coast Newspaper Co. Permission sought.*

The way in which one of the sacred ceremonial boards was used is described by Rogers (1977, p. 14) from his own observations. The particular sacred ceremonial board described was one of many which would be set up at various sacred places along the long journey taken to ceremonial grounds where a variety of tribes would gather. The Elder sat with his churinga across his knees, chanting softly as he tapped it. The board told of a legend which Rogers describes as ’extensive’. The sections applying to the local area would only be learnt by the

men who lived in that part of the sacred route.

This description is very similar to the way another esoteric mnemonic device is used, in another continent by a totally unrelated culture—the lukasa of the Luba.

Lukasa

The Luba Kingdom once flourished in what is now The Democratic Republic of Congo. Their memory board, the *lukasa*, is an extremely complex esoteric mnemonic device, constructed of wood and encrusted with beads and shells in a seemingly random arrangement. Designed to be hand held by Luba oral specialists, lukasa tend to measure about 20-25 centimetres in length and about 13 centimetres in width. The various attached objects, along with carved mounds, holes and lines, are used as mnemonic to vast amounts of oral literature and other information which was highly restricted information, slowly taught by older members (Reefe 1977; Studstill 1979). The *Bumbudye* were an economic and cultural elite, who made substantial payments of tribute to chiefs in return for privileges (Studstill 1979, p. 72). Members of the secret association, called *Mbudye*, were responsible for the initiation into the Luba esoteric wisdom and historical knowledge, and were the creators and principal owners of highly complex mnemonic devices and performance genres (Robert & Roberts 2007, p. 20).

Figure 3.16 Mbudye 'man of memory' pointing to features of the lukasa as he narrates Luba history or other stories. Photograph: Mary Nooter Roberts, 1989. Image reproduced with permission.

> The "men of memory" (*bana balute*) run their fingertips across the *lukasa* or point to its features while reciting genealogies, king lists, maps of protocol, migration stories, royal political practices and etiquette, as well as hunting, smelting, blacksmithing, and other critical technologies as well as the Luba Epic (Roberts & Roberts 2007).

The storyteller would touch the beads which symbolised each episode of the story being told. Various beads, or groups of beads, were identified by Reefe (1977) as key aspects of the myth; the Zaire River, river reeds, white birds, a battle between a column of ants and termites, and various interactions between leaders which led to the founding of the Luba Kingdom. Roberts and Roberts (1996a, 1996b) liken the use of the lukasa to the Method of Loci through analogy with the memory theatres of Renaissance Italy, through which an orator could assign highly complex narratives to the objects in a room. The person could then mentally walk the theatre, the room, the *lukasa* and in doing so, recollect the story he wished to tell. Roberts and Roberts write that enormously important cultural work is accomplished with and through works of art including the *lukasa*, figural stools, staffs, and other mnemonic objects (2007, p. 24).

> One can fully understand the complex symbolism of these objects only after introduction to the semantic system of the memory board, for like *lukasas*, Luba stools and staffs are mnemonic mapping devices; yet they are topological enlargement and particular adaptations of *lukasas'* cartographies of memory, architecture and landscape (Robert & Roberts 2007, p. 34).

A stylised tortoise shell design, representing the patron animal of the Bambudye, is found on the reverse side of all lukasas as well as on royal canes. Each striated triangle or square symbolizes an esoteric piece of information. The outside of the lukasa maps social relations and instigates mnemonic narrations, just as the more detailed inside does (Roberts & Roberts 2007, p. 26).

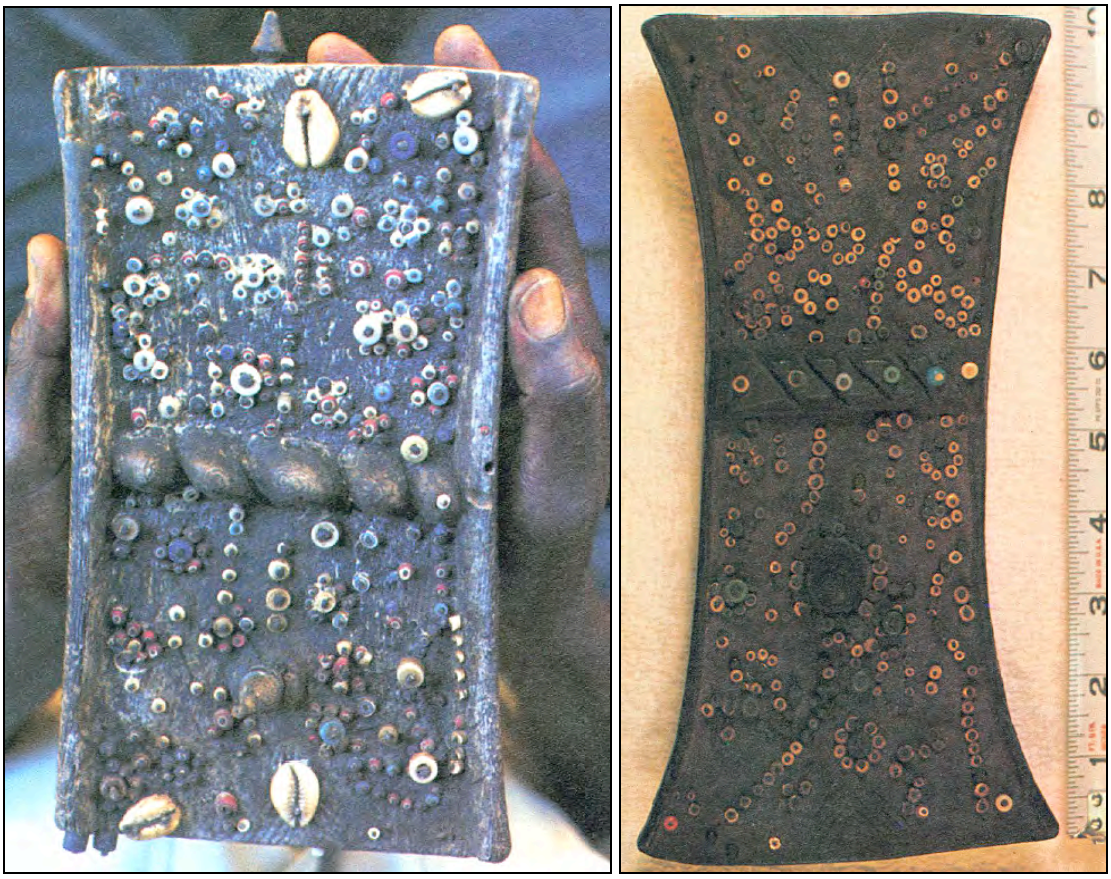

Figure 3.17 Lukasa of the Luba People, Zaire. Images reproduced with permission © Thomas Q. Reefe as published in African Arts, 1977, 10(4) p. 50.

Figure 3.18 The reverse side of a lukasa showing the tortoise shell design. Image reproduced with permission © Thomas Q. Reefe as published in African Arts, 1977, 10(4) p. 50.

Studstill (1979, p. 74-5) writes that knowledge of the movement of the sun, moon and certain stars, cultural heroes and social protocols were also encoded in the songs. Beads remind of behavioural expectations, deities and ancestral spirits, a pantheon of deceased rulers located in landscape places indicated by a map on the Bambudye lodge wall (Reefe 1977). Each bead or shell on the Lukasa can be read in multiple ways depending on the context. The *lukasa* also acted as an index to Bambudye ceremonies and the complex set of initiations required to progress through the society. This initiation sequence was likened to a journey through the maze of beads on the *lukasa*. The lukasa could not be read in isolation from the oral tradition retained in the memory of the owner. Reefe writes:

> Informants differed in their interpretations of certain bead patterns and carved markings but generally agreed as to the types of information the memory boards contained. This leads me to believe that there was a code for lukasa that was known to Bambudye members, but the exact manner in which this code was written with beads and carved marks depended upon the inclinations of the lukasa's creator (1977, p. 50)

Decorated musical instruments

Musical instruments, in particular drums, used to accompany the songs, are a medium for mnemonic inscriptions. The complex designs on the Saami shaman's drums aided the knowledge specialists, the *noajdde,* who performed a range of healing, divining and other religious roles along with their chants (*vuolle*) (Rydving 1993) and also provided information including where food could be located (Bradley 2000, pp. 7-12). Other traditional instruments, such as the Australian didjeridu / didgeridoo are often decorated with totemic designs (Fletcher 1996).

Curated bones – human and animal

Curated bones act as mnemonic devices linking knowledge to the ancestor or animal whose bones are present, usually as selected items rather than full bodies. The Akan of Ghana, Ivory Coast, for example, used skulls and jaw bones as relics of past rulers which also served as mnemonic aids (Vansina 1985, p. 45). Barth notes that the highly secretive cult master of the Baktaman of New Guinea only perform the initiation ceremonies at intervals over five years apart. His memory is aided by the use of sacred objects including bones of human ancestors and brush turkeys, kept in shrines within the temple (Barth 2002). The Saami of Scandinavia conducted *siejddes* at the sacred sites. Bones of a single reindeer may be buried with the antlers has left exposed. The feast may include killing and eating a bear whose bones would then be collected and eventually buried (Bradley 2000, p. 8).

Bones are also incised with images which appear to act as mnemonic to stories rather than as pure decorative art forms, such as the incised bones of Eskimo cultures.

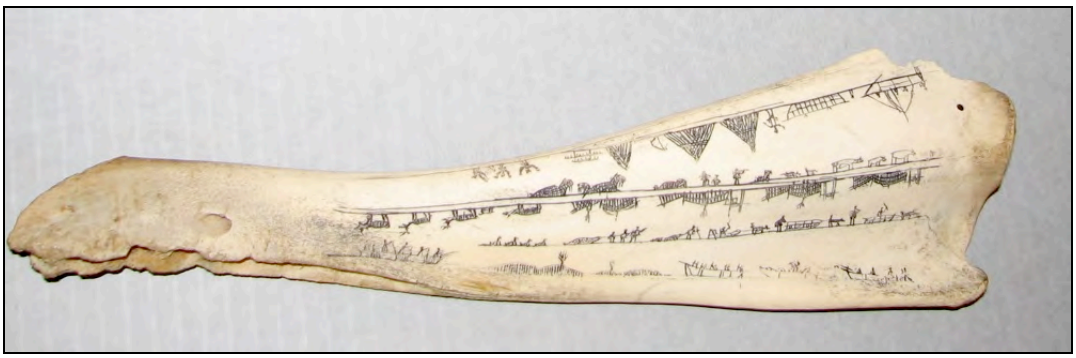

Figure 3.19 Arctic Eskimo incised whale bone. Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

Notched or decorated wooden sticks or boards

Message sticks

If there is to be a gathering, large or small, how do participants know when to leave for the ceremonial grounds, a trip which may take days or even weeks? Australian Aboriginal cultures sent message sticks with envoys containing details of when and where the tribes were to meet and who was being invited. Often a four or five days trek was required to deliver the message and then again to attend the gathering (Dixon & Koch, 1996; Flood 2006, p. 163; Howitt 1889; Mathews 1897). Observations made in early contact years describe the Australian Aboriginal message sticks. Mathews (1897) and Howitt (1889) describes message sticks as lengths of wood or bone, marked with a wide variety of geometrical, and sometimes representational, designs. These were used to summon people to gatherings for corroborees, to settle disputes or fight, or to attend the sacred Bora ceremonies where initiation and teaching took place on both restricted and public ceremonial grounds. Acting as a mnemonic device, the message was meaningless without the memory of the bearer who linked the various aspects of the message to the notches and marks on the stick. The message stick also acted as an identifier, ensuring the bearer safe passage across the lands of other groups.

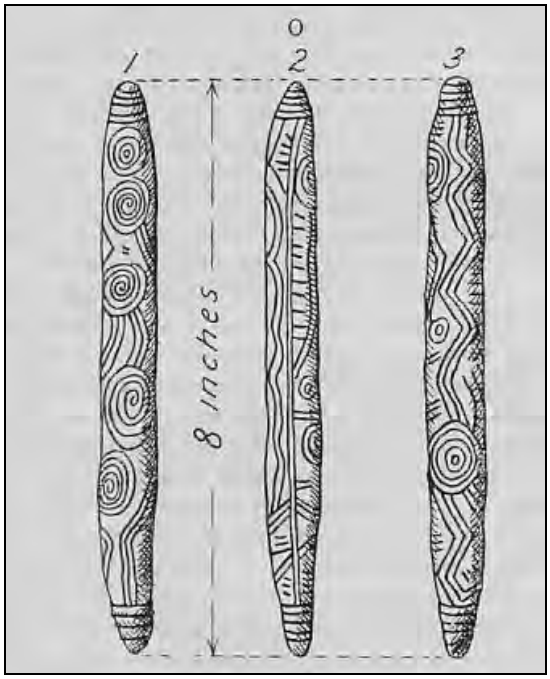

Figure 3.20 Message sticks as illustrated by David W. Carnegie, Spinifex and Sand, 1896-7.

The Native American Winnebago send out invitation-sticks for the Medicine Dance with messengers (Radin 1911, p. 151). Message sticks have also been documented for Northern Europe (Mathews 1897, p. 290), North America (Radin 1911, p. 151) and Africa (Keibel 1990). Diringer (1962, p. 32) considers message sticks to be a simple mnemonic device used by oral cultures in Australia, North America, Western Africa, China, Mongolia, and South-East Asia and Indo-China. Deciphering the messages associated with these sticks is dependent on the associated knowledge stored in the memory of those who carry them.

Messages are sent by those in power. Somali messengers are sometimes given the oral messages encoded so that only the sender and receiver, but not the messenger, understand them (Finnegan 1988, p. 166). At the third level of training in the *Bumbudye (*or *Mbudye)* secret society of the African Luba, a symbolic language was taught which enabled messages to be inscribed on wood or bark (Studstill 1979, p. 74).

Given the same purpose will have been required in prehistory, it will be suggested in Part Two that messaging is a social essential which needs to be addressed if the archaeology suggests large gatherings at performance sites attended by people from far away, as is the case in the three sites chosen for case studies: Chaco Canyon, New Mexico; Poverty Point, Lousiana and Stonehenge, Wiltshire.

History and genealogy on staves

Extremely long notched sticks have been recorded as being used as mnemonic to history by Native Americans (Krupat 1998) and to a great deal of cultural knowledge in

southern Nigeria (Kiebel 1990). Campbell (2005) describes a Rarotongan staff which he likens to the New Zealand Maori *rakau whakapapa,* each knob of which represents a generation enabling the oral specialist to recite the genealogy and associated events by touching each of the knobs in turn. A similar system is described by Hage (1978) for the Iatmul of the Sepek River area of New Guinea. The Iatmul retain an enormously elaborate totemic system of personal names as a mnemonic for their mythology. A 'learned man' may possess between ten and twenty thousand multi-syllabic personal names, each of them acting as mnemonic to the songs possessed by the clan. Constant recitation helps recall the names. In every large ceremonial house there is a 'stool' which actually has a back, like a chair, into which is carved representations of totemic ancestors, used to aid memory in ritual and learning.

Power can be manipulated through the reading of these staffs. Members of the secret society of the Luba, the Mbudye, among others, may possess staffs which encode the histories, genealogies and migrations of a particular family, lineage or chiefdom. The 'motifs are the mnemonic cues to assist narrators in politically motivated recollection of the past' (Roberts & Roberts 2007, p. 38).

As shown below, The Peabody Museum of Archaeology and Ethnology collection includes incised sticks labelled as 'memory sticks' from Africa.

Figure 3.21 African memory sticks, Peabody Museum of Archaeology and Ethnology, Harvard University. Photograph: Lynne Kelly.

Decorated utilitarian objects

Not all mnemonic etching and painting is on objects used specifically for that purpose. Mobile cultures, in particular, need to limit the number of objects they carry, so it is not surprising that the surface of utilitarian objects are used for symbolic cues to information.

Coolamon etchings

The coolamon is a food dish used by many Australian Aboriginal cultures. Isaacs (1984, pp. 238-9) shows images of a range of desert Pitjantjatjara women with the decorations on their coolamon, also known as *piti*. Isaacs describes these decorations as serving to record the travels of ancestral beings. I have been granted custodianship of the coolamon shown in Figures 3.23 and 3.24 through Nungarrayi (Warlpiri) who described it as:

> The coolamon is from the Western Desert and it is unknown which Western desert language/tribal group it came from. It is very old (over 100 years) and so its makers and traditional owners have long gone.... The coolamon is a child's coolamon and would have been used by a little girl to collect bush foods as she imitated her mother and female relatives. The symbols on the coolamon are a 'message stick' and represent messages only known by those who carved them. As coolamons were carried from place to place, the symbols reminded people of meetings, places, stories, events and travels across the landscape's dreaming tracks, in the footsteps of the ancestors and creation spirits. Such symbols also had levels of meaning according to who read them. Initiated women would know the deeper meanings. Coolamons were used by women as the gatherers and nurturers to carry food, water, small animals and lizards, honey ants, sugar bag (wild bush honey), medicine leaves and plants and even babies! The coolamons were extremely important possessions. They supported life and carried messages (Nungarrayi 2010, pers. comm., email, 22 January).

Figure 3.22 An Australian Aboriginal coolamon showing abstract mnemonic carvings. Photograph: Lynne Kelly.

Figure 3.23 Underside of an Australian Aboriginal coolamon showing abstract mnemonic carvings. Photograph: Lynne Kelly.

Multiple media are often interlinked when representing the knowledge of the culture. For example, in the American southwest, Pueblo pottery may display images of kachina (katsina), the mythological characters who will be described in Chapter 7 and carry much of the knowledge of the culture in a sequenced performance format. Represented through ephemeral costume, and kachina dolls (see below), the same characters are painted on pottery.

Figure 3.24 Kachina representation on Pueblo (Hopi) pottery. Peabody Museum of Archaeology and Ethnography, Harvard. Photograph: Lynne Kelly.

Knotted objects

Inca khipu or quipu

A khipu is a device constructed from knotted cotton or camelid cords used by Andean cultures, in particular the Inca, to record information. The main cord has any number of attached cords, which hang vertically when used. Any number of subsidiary cords can be added enabling great complexity. Different colours could also be used to create patterns for encoding information.

Brokaw (2010, pp. 2-21) offers a convincing argument that the khipu (his preferred spelling) was far more than a numerical device serving accounting needs of the Inca. Khipu are known to represent numerical data such as demographics, tributes and some form of calendrics. Researchers now believe that khipus were also used to convey other types of information, such as narratives. Colonial texts refer to the use of khipu for recording laws, rituals and histories, each category of information corresponds having its own official functionary. Experts in the creation and reading of khipus were a knowledge elite, known as *quipucamayos* by the Incas and early colonial authorities. Colonial records indicate that the knowledge associated with a khipu was restricted. A *quipucamayo* was able to read his own khipu, but it was undecipherable to others unless they were specifically taught by him (Niles 1999, p. 6).

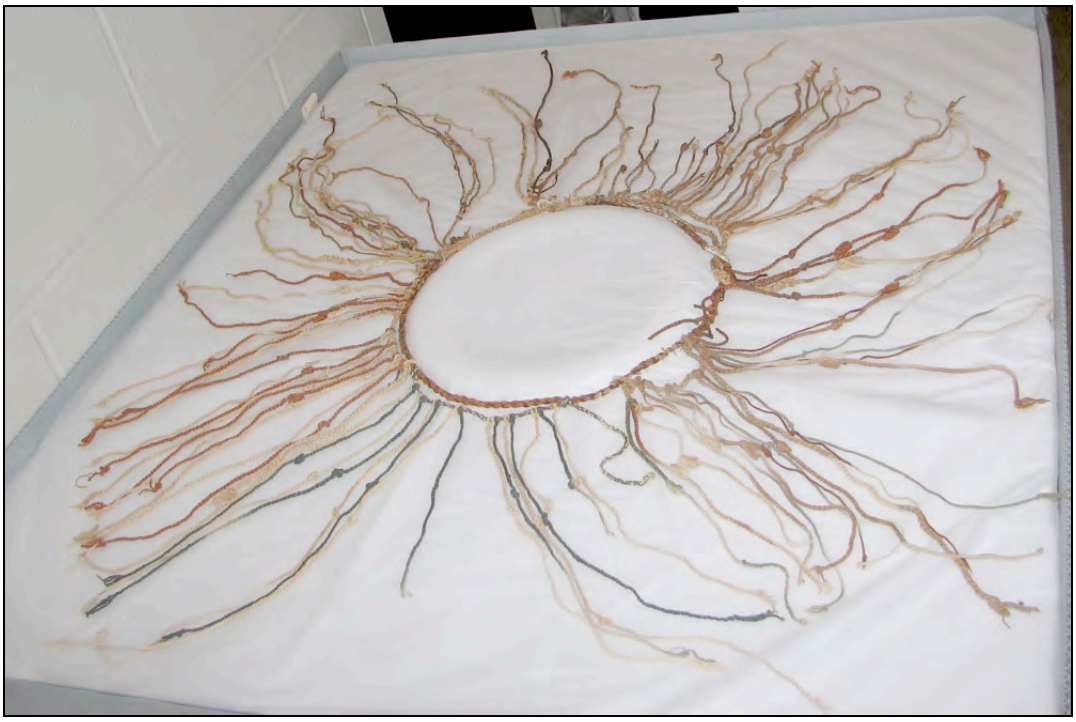

Figure 3.25 Inca khipu / quipu. Peabody Museum of Archaeology and Ethnology, Harvard University. Photograph: Lynne Kelly.

Figure 3.26 Inca khipu / quipu. Peabody Museum of Archaeology and Ethnology, Harvard University. Photograph: Lynne Kelly.

Watson and Turnbull claim that it is easy to underestimate the power of mnemonic devices. They argue that the increase in scale and power from the Anasazi to the Inca 'can be explained by the Incan augmentation of knowledge transmission through the use of additional devices of stone alignments and knotted string, of *ceques* and *quipus*' (1995, p. 123).

Houston writes that knotted cords, sometimes including other objects such as shells, were used as mnemonic devices by the Salish in the American Northwest (2004, pp. 224-5) while Diringer lists their use by a number of Nigerian tribes, the Li of Hainan, the Sonthals of Bengal, by some indigenous inhabitants of Polynesia, southern Peru, central and western Africa, and California, and by inhabitants of the Riukiu, Solomon, Caroline, Pelew and Marquesan Islands (Diringer 1962, p. 32). Innis argues that the role of knotted mnemonic devices was a precursor to writing:

> Devices had been used [by Semitic peoples] to facilitate continuous repetitions and to strengthen memories, including the knot. Aids to memory began with constant diligent repetition and developed form in meter and rhyme, in knot symbols as mnemonics, and finally in writing. …Even 500 years after its official publication in the time of Ezra about 444 BC men were able to recite the whole Bible from memory (Innis 1964, p. 101).

Wampum strings and belts

Wampum strings and belts were made by a wide range of American Indian peoples. Using white and purple beads made from the quahog clam shell, mnemonic aids to information was woven into the wampum. Haas (2007) describes the method by which the wampum user would memorise a visual representation of the belt and then create associations with the accompanying story. Haas compares this to Cicero's description of the Method of

Loci. She also explains how wampum can communicate more than one story, using meaning layered within the materials. In order to retain the memory, for both the knowledge-keeper and the community, the wampum are revisited on a regular basis to be recalled and performed. The wampum may consist of a broad belt consisting of shells or beads strung together to form a picture representing an important event (Diringer 1962, pp. 33-4) or to record treaties (Vansina 1985, p. 44; Goody 1987, p. 17).

Figure 3.27 Wampum Belt, Peabody Museum of Archaeology and Ethnology, Harvard University. Photograph: Lynne Kelly.

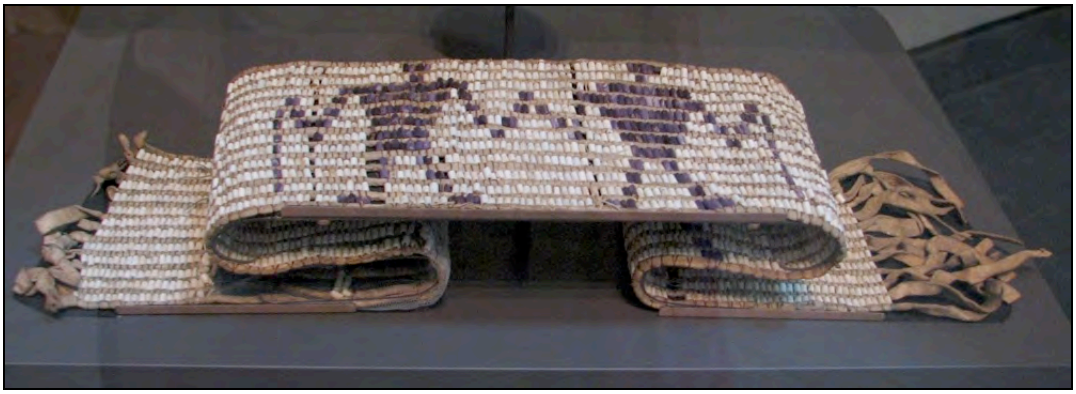

Figure 3.28 Wampum Belt, Wendat (Huron), National Museum of the American Indian, Washington. Photograph: Lynne Kelly.

Luba strings of beads

Roberts and Roberts talk about a range of beaded objects used by the Luba, which act in support of the most critical mnemonic device, the *lukasa*, discussed above. 'With stunning acumen, Luba "men of memory" can relate very complex historical accounts using what the untrained eye may seem to be a single strand of beads' (2007, p. 27) *Nkaka* are beaded headbands whose designs are dominated by rows of isosceles triangles similar to those seen on the edges and backs of *lukasa* boards. *Nkata* support a semantic code, the rows of triangles acting as memory cues for the recollection of the regulations of royalty among the African Luba royal officials (2007, pp. 25-6).

Bundles of non-utilitarian objects

Many cultures use a collection of objects as part of ritual. Although these are usually acknowledged as having religious significance, this thesis argues that they also act as mnemonic technologies, ensuring that all relevant aspects of the knowledge system are sung. A bundle of like objects enables the sequencing of a large number of verses encoding knowledge. Gelb writes about a number of different cultures where knowledge specialists use groups of objects as memory aids. Strung on a piece of cord or carried around in a net, Gelb writes that the group of objects 'can be considered the repertoire of his songs' (1952, p. 4).

Working through a bundle of items is a simple method to provide a check that each of the associated songs is performed. If there is a way of ordering the items, then a sequenced performance is indicated by using the items as memory aids for each song. For example, the American Blackfoot Indians use a bundle of objects to provide what is effectively a running sheet for the ceremony. The bundle is opened and the correct song sung for each object in a required order. Some ceremonial bundles contain over 160 items (Morley 2006, p. 97). West African Mende healing specialists carry a bag of stones, each representing a particular illness, and which are manipulated as the elder asks the patient questions (Little 1949, p. 206).

Bundles cannot be seen in isolation from other mnemonic technologies. The American Winnebago Medicine Dance involves bags made of eagle, hawk, squirrel, weasel, beaver or otter skin to hold the objects, along with a drum and gourd rattles to accompany the dance. Invitation-sticks are sent, and so also form part of the mnemonic package (Radin 1911, p. 153).

As described by Tedlock (1992, pp. 163-7), Highland Mayan 'daykeepers', members of the Quiché language group of Guatemala, have worked within an oral tradition into contemporary times. They use sequences of tossed seeds to help remember divinations and their extremely complex calendar. In West Africa, various cultures use sets of cowries to give combinations as mnemonic aids. One well documented example is that of the Yoruba.

Yoruba mnemonic shells

The Yoruba are well known for their divination system based on the use of sixteen cowries or pine shells (McClelland 1982). It is necessary to look beyond the idea that divination is simply about predicting the future to see the full complexity of the Yoruba system. As described in Chapter One, the verses encode, along with ritual instructions, knowledge of animals, plants and a pharmacopoeia, how to protect against smallpox infection, navigation instructions, rules for trading, guidelines for the use of power and authority, methods for dispute resolution, cultural history along with social and legal precedents. Yoruba

> divination is both a body of knowledge and a system of social, emotional, and pathological control, employing relevant historical and mythological precedents contained in the special divination corpus to be recited, chanted or sung (as appropriate) by the diviner (Akinnaso 1992, p. 84).

There are a number of different Yoruba divination systems, but the most common rely on the manipulation of sixteen palm nuts or cowrie shells with the recitation of the text associated with the particular configurations resulting from the fall of the shells or nuts. By constructing a mythological association with each combination, and a heirarchy to the associations, a sequenced knowledge system emerges. In the simpler version, cowries are cast on basketry tray and the number of shells facing mouth up are counted, giving seventeen possible outcomes. Bascom (1980) includes 305 pages of song-poetry which represents all the verses known to a single, knowledgeable sixteen-cowrie diviner.

McClelland (1982) details the related, but more complex, Ifá divination, based on two throws of sixteen palm nuts or by casting the divining chain (*òpèlè*). Again the outcome is determined by how many of the nuts fall face up. There are sixteen spiritual beings known as the Odù, who appear in a strict sequence, each of whom visits each other Odù in order. Sixteen individual Odù enables 120 different combinations of two Odù. As the order of the two Odù is also significant, this leads to 240 minor Odù - the word in this case being used to represent the outcome and associated knowledge. There are also the 16 principal individual Odù bringing the total to 256 different readings which include stories of varying kinds, from myth to narrative of real events. This sequenced group of 256 Odù is estimated to contain over 1200 verses at its most minimal level.

West African diviners may start the initiation from as early as ten years old while higher stages of training usually involve travelling broadly to acquire more knowledge

(Akinnaso 1992, pp. 91-3).

Figure 3.29 Ifá divination board. Photograph by Jogo de Ikin Orossi, used with permission.

Figure 3.30 Ifá divination chain. Photograph by Jogo de Ikin Orossi, used with permission.

Stones, sticks and pieces of wood

Collections of stones, shells and sticks can be arranged into various matrices and used as teaching aids. The Inuit, for example, use stones to represent the interrelationship of

celestial bodies, and seasonal behaviour of the sun (Macdonald 1998, p. 3). The navigators of the Pacific islands, such as the Caroline, Marshall and Gilbert Islands and the atoll of Puluwat (now Poluwat), are renown for their extraordinary ability to navigate across hundreds of miles of open ocean. Each student must pass through many levels of initiation and testing of highly restricted knowledge to finally become a navigator, as will be discussed in detail in Chapter Five. Suffice to say here that the knowledge system involves the memorisation of many lengthy chants, teaching about marine animals and plants, navigation by the stars, swells and islands, weather and food sources, all learnt through complex mental imaging studied through the manipulation of stones and stick charts - most learned on land before they set sail (Farrall 1984; Gell 1985; Gladwin 1970; Hage 1978; Turnbull 2000).

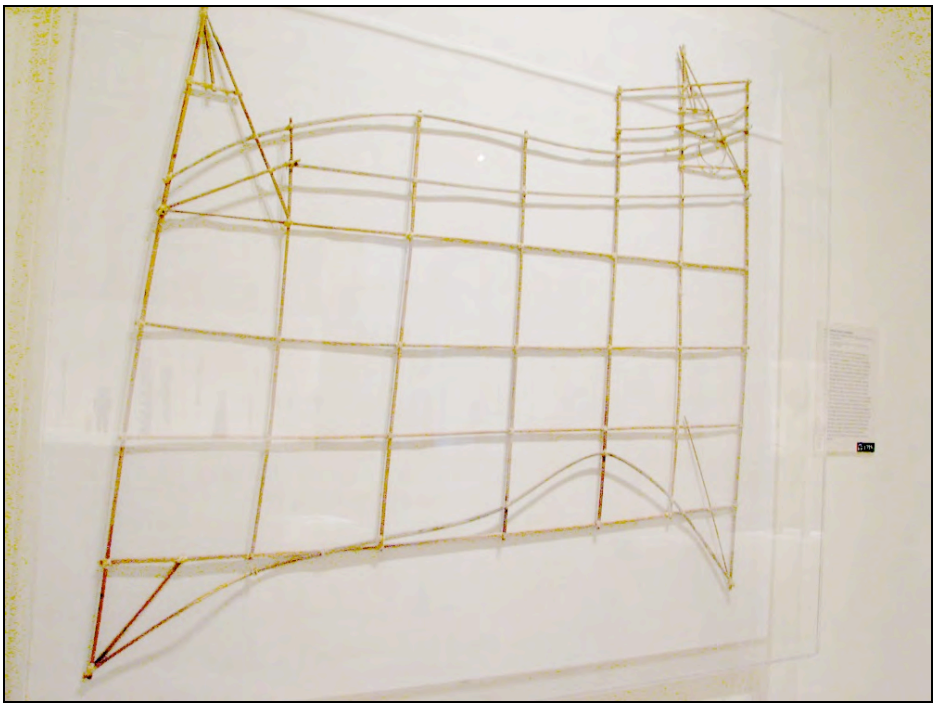

Figure 3.31 Marshall Islands stick charts. Metropolitan Museum of Art, New York. Photograph: Lynne Kelly

Enigmatic non-utilitarian structures, such as the representation of a stone canoe, may be part of a teaching program. In this case, the stones enable the student to sit in a position and be tested on the behaviour of swells around the canoe, also represented by stone (Lewis, 1973, p. 185-6).

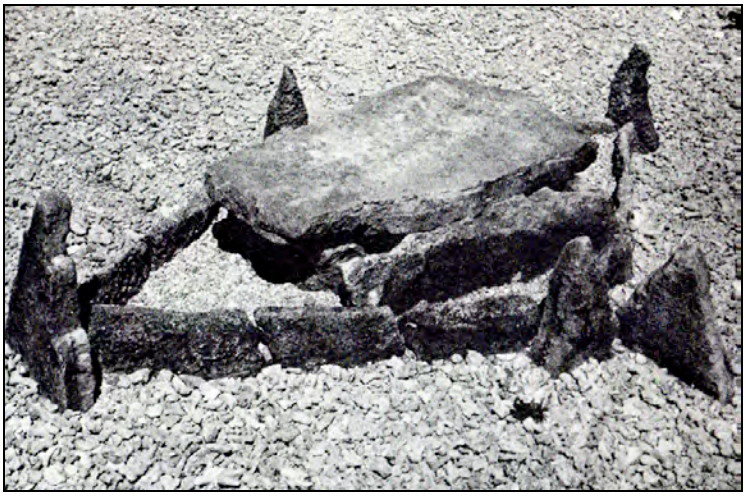

Figure 3.32 Stone teaching canoe, Gilbert Islands, Source: "We the Navigators", David Lewis, 1973, pp. 185-6. Permission sought.

Representation of mythological ancestors

Representations of mythological beings are found in most, if not all, traditional cultures, acting as mnemonic to their stories and thus to the structured encoding of knowledge. By appearing as dictated by the ceremonial calendar, the mythologies, as told, are sequenced.

Dance costumes, masks and props

In non-literate cultures all over the world, masks are worn by those initiated into the restricted knowledge when representing mythological characters. Finnegan (1988, p. 66) refers to the wearing of masks as adding an extra dimension of distance between the performers and the audience during dramatic performances of non-literate peoples. This practice is widespread, and can be seen in as disparate cultures as such as Australian Aboriginal language groups (Flood 2006, p. 154), the Hopi of the American Southwest (Titiev 1972, p. 103), the Inuit (Macdonald 1998, p. 23) and the West African Yoruba (McClelland 1982, p. 36). As aids to identify the mythological characters, and therefore their stories, the masks act as part of the mnemonic repertoire.

Figure 3.33 Bundu Mask, Mende People, Sierra Leone. Phoebe A. Hearst Museum of Anthropology, San Francisco. Photograph: Lynne Kelly.

Figure 3.34 Igbo mask from south-eastern Nigeria. Phoebe A. Hearst Museum of Anthropology, San Francisco. Photograph: Lynne Kelly.

The performances representing the stories of the mythological beings are not the only way in which these stories are formally represented in material culture.

Figurines

Figurines may simply represent a person, or a single characteristic, such as fertility, but this cannot be assumed. In fact, Roberts and Roberts write:

> As is too often the case with other African art objects, Luba works have been labelled simplistically as “fertility Figures” due to their nudity, or “ancestor Figures” because of what is interpreted as ethereal spirituality, without an accurate sense of what they were intended to mean for the people who originally made, owned and used them (2007, p. 12).

Art forms, including figurines, may represent a mythological or real character within a story and hence become an integral part of the knowledge system. As will be described in detail in Chapter Seven, the Pueblo Indians refer to some of their mythological beings as kachina. As a complex, ordered information set, the kachina are represented in many media. To establish a framework for the knowledge of the hundreds of kachina characters, ‘dolls’ are made and given to children. These are not playthings, but revered figurines representing the kachina, whose stories will be revealed in more and more depth according to the clan and level of initiation the child takes on his or her adult role.

Figure 3.35 Hopi kachina dolls. National Museum of the American Indian, Washington. Photograph: Lynne Kelly.

Figure 3.36 Hopi kachina dolls. National Museum of the American Indian, Washington. Photographs: Lynne Kelly.

A set of figurines can act as a mnemonic to the index of the knowledge system. During the initiation rites among the Senufo of Southern Mali, a collection of fifty-eight figurines, representing animals, people or symbols of activities, are shown to novices in a prescribed order. The elders use the figurines as a lexicon of symbols which Lévi-Strauss writes forms the 'canvas of instruction imparted to them' (1966, p. 154).

Ephemeral art

As ephemeral art is unlikely to be reflected in the archaeological record, it will be only mentioned here for completeness. Body painting and tattooing is used for ritual and mnemonic purpose by non-literate societies across the world, for example the North American Winnebago (Radin 1911, p. 153), the Pacific Marshallese (Spennemann 1992) and Australian Aboriginal cultures (Morphy 1991). The tattoos of Malaysian tribes, recording genealogies, kinship and clan affiliations in etchings on the body, for example, are given as an example of a worldwide use of 'information-bearing representations, functioning as *aides-mémoire*', and that such 'support of social memory is archaic and spread through out the world' (Fentress & Wickham 1992, p. 17).

The use of a particular ephemeral form of mnemonic representation is probably in association with other forms. For example, Flood describes Australian men's sacred corroborees as

> particularly elaborate and usually involve lengthy body painting, making of large, decorated headdresses and sometimes preparation of a painting or sand-sculpture on the dancing ground. Before ceremonies, hours are spent on body decoration, applying special designs with paint made from pigment mixed with water. …When the ceremony is completed, all such ground paintings, sculptures and body decorations are obliterated (Flood 2006, p. 50).

Sand paintings are also widespread and vary greatly in form and complexity. In central Australia, geometric forms are used commonly in stories drawn in the sand or on the ground (Morphy 1998, p. 114). The Navajo sand painting of the Earth looks like an anthropomorphic figure, but is a memory aid for locations and animals, each of which then have further knowledge to be imparted through song, story or dance (O'Bryan 1993, p. 18).

Conclusion

This chapter described some of the most widely used forms of devices used as memory aids for the knowledge system in oral cultures around the world: natural or cultural landscape features, rock art, poles and posts in structured arrays, curated bones, notched sticks and bones, enigmatic decorated or engraved hand held objects, decorated utilitarian objects, knotted objects, bundles of non-utilitarian objects, pictographic representations, organized sets of stones, sticks and pieces of wood and representations of mythological ancestors such as figurines and masks.

The examples given provide powerful evidence to use as a basis for evaluating cultural objects in the archaeological record. When placed in context, especially when linked with performance or ceremonial sites, these objects can be used to hypothesise about the role of a knowledge elite within a society. As will be shown in Part Two of this thesis, the consideration of mnemonic technologies can lead to some radical new interpretation of enigmatic archaeological sites associated with small-scale societies.

Chapter 4 – Animals and plants in oral tradition

Introduction

In songs, stories, mythology and visual representations of contemporary and ancient oral cultures, animals and plants feature heavily. Although oral tradition is usually represented as preserving religion and history, the next two chapters will show that detailed knowledge of the natural sciences is also stored in a wide variety of non-literate cultures. The landscape, animals and plants are integral to the knowledge system – not just knowledge about them for food, shelter and clothing, but also as metaphor to serve the entire integrated system of knowing. Knowledge includes detailed identification, habitat, behavioural information and seasonal variations. This chapter will present an overview of the vast store of information of both wild and domesticated species, including the role of classification.

It would be naïve to limit the consideration of animal and plant knowledge to that which is essential for survival, or even that which is merely useful. All humans store knowledge for its own sake. In fact, Lévi-Strauss writes: 'The thirst for objective knowledge is one of the most neglected aspects of the thought of people we call "primitive"'(1966, p. 3). He goes on to give a range of examples of biological knowledge from non-literate cultures and concludes that 'animals and plants are not known as a result of their usefulness; they are deemed to be useful or interesting because they are first of all known'. This aspect of 'native' science, Lévi-Strauss argues, 'meet intellectual requirements rather than or instead of satisfying needs' (1966, p. 9).

As will be shown below, classification of plant and animal species include the majority of species present, not just those used for food or medicine. The next chapter will look at the need to retain genealogies, make astronomical observations, maintain annual calendars and navigate vast distances through forest and deserts, across oceans and even on moving ice. Together, these two chapters will argue that the storing, maintenance and transmission of accurate scientific knowledge is highly valued within most, if not all, oral traditions.

Science and the 'orality/literacy divide'

Despite a wide variety of definitions of science, there is general agreement that scientific ideas must be falsifiable and able to be tested, based on experiments and empirical data, correctable and able to take in new data, be tentative and not absolutely certain. The knowledge encoded in the oral literatures discussed in this and the following chapter meet all these requirements. The ability to adapt to new and changing environments, to develop

treatment of foodstuffs to make them edible, or even domesticate animals or plants, to modify hunting technologies or develop new boats—all require testing and empirical data. It has been claimed that scientific thinking is a consequence of literacy (for example see Goody 1977, p. 51). There is no doubt that literacy enhances the ability to store scientific information, reflect upon it and develop new levels of cognition (Akinnaso 1992, p. 72), but it is not a prerequisite for scientific behaviour. As will be shown below, oral cultures observe their environment and formally store rational information—it is just stored in a different, and far more integrated, context than that of Western science texts.

Finnegan (1977, p. 259) argues that there is a misleading distinction made between modern, rational, literate 'us' and the primitive, magical, oral 'them', and that the view that 'they' are 'somehow mystically closer to nature than ourselves' has been popular with sociologists and romantics who dream of a vanished natural past, but this cannot be sustained by research. Denny (1991) also writes that oral cultures are usually misrepresented as 'prelogical' and 'magical', but he argues that this is an effect of Western observers who are used to knowledge packaged in decontextualised formats while oral cultures tend to retain knowledge within context and within an integrated knowledge system. Bradley (2010, p. 78) wrote about learning an Australian Yanyuwa songline (*kujika)*:

> So much knowledge was being presented to me, at many levels and intricately interrelated. I was struggling to find words for much of the material as it was deeply encoded and dependent on other knowledge.
>
> There were many verses describing the myriad [of] species–fish, sharks, birds and other animals and plants, whose names in Yanyuwa were so familiar to my informants that I had yet to identify in English.

At the highest level of knowledge, the full complexity of the individual species is recorded in song. John Bradley writes 'I was amazed by the detail of this *kujika*, especially of the different species of sea turtles, their life cycle and habitats; it was a biology lesson in sung form' (2010, p. 216).

The concept that non-literate thinking is also non-scientific is still very much current in the academic debate. For example, a major writer in the field, David R. Olson, in a chapter titled 'Literacy and objectivity: the rise of modern science' concluded that non-literate peoples 'failed to distinguish the given from the interpretation' (1991, p. 156). While acknowledging the risk in using children as a basis for analysis of adult thought, he concluded that 'if the critical factor is the set of assumptions held about language and texts, we may treat data on adult non-literate and child preliterates as similar' (1991, p. 157). Given ample

evidence that oral cultures offer commentary and interpretation (for example, see Bradley 2010), I can see no justification for Olsen's assumption, nor for his attributing child-like thinking to adults, whether literate or not. Olson continues arguing that

> writing, in fact, split the comprehension process into two parts, that preserved by text, the given, and that provided by the reader, the interpretation. …The result was modern science, science built on the notion of a discontinuity between observation and inference, facts and theory, claims and evidence. Modern scientific epistemology was, therefore, a by-product of the Reformation hermeneutics and objectivity, a by-product of literacy (1991, p. 161).

Considering non-literate adults as similar to preliterate children creates a divide between literate and non-literate cultures which is far greater than that considered by those who've been initiated into non-literate cultures. The method of maintenance, storage and transmission of scientific knowledge is significantly different. The degree to which experimentation can be undertaken is also clearly different. But the assumption that modern scientific thinking does not occur within non-literate cultures cannot be justified so simply.

The animal stories with which we are most familiar are the public stories, the children's stories which serve to name the animal and associate it with identifying features that enable rapid recognition. This forms a structure for added complexity in the adult oral tradition. It is only once an animal is named and reliably identified that its behaviour and uses can be discussed and a knowledge base built. For example, Tyler (1979, pp. 116-7) describes a Hopi story which forms part of the emergence myth, when all Pueblo were still underground, looking to emerge onto the Earth. Birds were sent out to explore, including the fast flying chimney swallow. The myth reflects the way the chimney swallow (*Hirundo rustica*) seeks cool air draughts and its flight pattern of swooping and rapid turning. Tyler quotes further Hopi myths in which the cliff swallows (*Petrochelidon pyrrhonota*) build mud nests which have some similarities to the mud pueblos, the buildings of the Pueblo people.

Issues with enthnobiological method

It is beyond the scope of this thesis to give a detailed analysis of ethnobiological methodology, however a few examples will illustrate some of the issues involved in understanding the scientific knowledge of non-literate cultures. Tideman, Chirgwin and Sinclair (2010), in the opening chapter to *Ethno-ornithology: birds and indigenous people, culture and society* (Tideman & Gosler 2010), discuss the difficulties associated with gaining academic recognition for indigenous knowledges due to the simplistic representations of birds

in popularly quoted indigenous stories and myths. They consider even worse the total lack of recognition of the existence of non-Western ornithology.

Four decades ago, Lévi-Strauss (1966, p. 6, 46) argued that without a solid botanical knowledge and language, it is impossible to understand the thinking and language of traditional cultures, yet anthropological reports are rarely constructed by those with both the linguistic and scientific training required. Ethnobotanist, Richard I. Ford (1978b) argues that Western botanical knowledge may be an insufficient basis for complete understanding of the language and plant uses of a traditional culture. He quotes, as an example, research among the Hanunóo in the Philippines who named many more plants for the region than did Western science at the time of the studies. Lévi-Strauss notes that indigenous names were recorded for 1,625 Hanunóo plant types, grouped into 890 categories which correspond to 650 genera and about 1100 species in Western botany, of which 500 to 600 species are edible and 406 species used purely for medicinal purposes (1966, p. 138).

One of the most obvious difficulties is that much of the scientific knowledge may be restricted and hence access to information is simply not possible for those not initiated into the culture. Those who are initiated are not able to release the information for publication. In most cases, the ethnographers, anthropologists and early missionaries who reported on the cultures soon after contact were not initiated at all. Australian zoologist, Sue Churchill, explains the issue from experience (Churchill 2008). During a 1983 expedition to study Ghost bats (*Macroderma gigas)* in the Uluru region, Churchill and her colleague, Peter Helman, approached the traditional Aboriginal custodians to obtain permission to be on their land and ask for assistance locating caves or colonies. The meeting of traditional owners and tribal elders included some elderly men and women who had grown up in the traditional culture, relatively untouched by colonists until the middle of last century. Churchill had prepared a study skin of a Ghost bat to pass around to clarify the animal she meant.

> When the moment came to show them the bat there was a collective gasp of shock. Women present at the meeting hurriedly covered their faces. The men looked stunned. It was a terrible moment. It turned out that this animal had great spiritual significance to these people and that it had to do with men's business. As a female I had committed a serious faux pas (2008, p. 22).

After much discussion, the Elders found a way within the custom to enable Churchill to travel to the sites.

The use of dead specimens, so prevalent in Western science, also causes other problems. Indigenous cultures do not store dead specimens for identification—they identify

the animals and plants in context, and so rely much more heavily on behaviour and habitat. Western classification keys rely extensively on specific physical properties of the animal species, many observable only under the microscope. Traditional identification, in contrast, is often linked to behaviour in context. As a birdwatcher, I identify species on 'jizz', that is the overall impression of a bird, including their appearance, behaviour, flight pattern, wing shape in flight, call and habitat. I would struggle to identify many species from dead, dried out specimens. I identify spiders, often only to genus, initially by the presence or absence of web or burrow, the web type (if present) and behaviour. I would find very few spiders easy to identify as dead specimens out of context. Despite these issues, detailed studies into indigenous classification have been done based using identification of dead specimens. For example, the ethnozoology of the Tewa Indians (Henderson & Harrington 1914) and ethnoentomology of the Navajo (Wyman & Bailey 1964) classifying hundreds of species relying on dead specimens and methods which serve Western scientific taxonomy far better than traditional classification. That is not to deny that non-literate classifications are methodical, based on repeated observation and carefully built theoretical knowledge, while being comparable to those still used in zoology and botany (Lévi-Strauss 1966, p. 43).

Another significant reason why so little is known about the science of oral cultures is the difficulty in converting knowledge, stored in a performance mode, to text. The book, *Punu: Yankunytjatjara plant use* (Goddard & Kalotas 2002) is one of a small collection of books which offers some insight into the depth of knowledge of the natural sciences among oral cultures. The translator, Cliff Goddard, comments that much of the information was given to them through performance. But an even greater difficulty is the range of expertise needed. *Punu* required a team of seven Yankunytjatjara Elders, a linguist and a botanist. Hunn and Thornton consider that successful ethnoornithology requires close collaboration between a professional ornithologist, a linguist, an ethnographer and indigenous experts (2010, p.182). It is not surprising that most ethnographic studies do not address scientific knowledge.

Any academic attempting to document the depth of indigenous scientific knowledge was in the past, and is now, part of a radical change in the way indigenous cultures are viewed. Ethnoscience is a growing discipline, but it is still rare that a team with the expertise needed is ever available to be applied to the task. The ethnographic studies quoted below will represent only a small fraction of the knowledge of the culture they are discussing.

The depth of indigenous knowledge of plants and animals

When reading archaeological interpretation of life in prehistoric sites, or anthropological reports of travels among indigenous cultures, it is rare to find any mention of indigenous scientific knowledge. The emphasis is usually on what was eaten and how

dwellings were structured, and what are described as exotic religious rites. Beyond the specialist research into ethnosciences, almost no acknowledgement is made of the depth of knowledge on local flora and fauna species. Most animal species will not be observed in the daily routine, and most plants blend into the background unless specific notice is taken. It is too complex a knowledge base to be simply remembered as a result of daily activity. Early ethnographers gave little credence to existing knowledge of 'primitive' peoples. The desire to educate them in Western ways and beliefs blinkered those who made the first contact to the depth of the knowledge they were literally overwriting.

In-depth practical knowledge of botany and zoology is widespread in non-literate cultures (Madden et al. 2006) while systems of classification are widely found in oral cultures, encompassing plants, animals, people and disease types (Vansina 1985, p. 134). As noted in Chapter One, mobile hunter-gatherer cultures often classify plants and animals to as many as six levels (Fowler 1999, p. 419) while sedentary oral cultures also classify extensively (Majnep & Bulmer 1977, pp. 45-9; Goody 1977; Turnbull 2000, p. 150; Wyman & Bailey 1964). Levi Strauss (1966) gives many examples of cultures from across the world classifying hundreds and, in some cases, thousands of species. He notes the issue of ethnographers without a background in science failing to recognise the scientific content of the language of the cultures they were studying. In one example, he describes an ethnographer in Africa who, having no interest in botany, didn't have the vocabulary in her own language to understand what the indigenous people were telling her, while the 'natives on the other hand took such an interest for granted' (1966, p. 6). Rappaport writes that hundreds, if not thousands, of species of plants are found within the quite limited Tsembaga territory of New Guinea. The native system of naming and classifying wild plants usually corresponds to the basic level in Western classification. When classifying domesticated plants, they often identified to subspecies, that is plants of the same species displaying distinct properties, such as geographic variations (1967, p. 34).

The animals which are hunted, primarily mammals, birds and reptiles, represent only a small proportion of the fauna recorded in indigenous knowledge systems. Invertebrates, including insects and spiders, are a far more numerous component of any ecosystem. Rappaport (1967, p. 37) writes that the New Guinea Tsembaga retain an elaborate nomenclature of invertebrates. The Navajo / Navaho name and classify over 700 species of insect, the names, sounds, behaviour and habitats being encoded in myths, songs and dry (sand) paintings with only a small number of these having a role in human medicine, veterinary medicine, witchcraft, or have some other 'practical' reason for classification, such as that they are bothersome (lice, gnats, mosquitoes, sheep ticks, flies), bite, or are eaten (Wyman & Bailey 1964; Sutton 1995, p. 255). The vast majority are classified because 'the

Navaho love to categorize' (Wyman & Bailey 1964, p. 17). Curiosity is not limited to literate peoples.

Zoologist, Alan Yen, feels that the role of invertebrates in traditional diets is greatly underestimated partly because of the disgusted reaction of ethnographers inhibiting the disclosure of indigenous people (2010, pers. comm., 21 May). Lévi-Strauss reports the Caduveo in Brazil hiding their delicacy, the *koro* grubs, due to European jeering (1992, p.159) while ethnologist Junius Henderson, used the phrase, 'the most disgusting varieties of food' when describing the Shoshone collecting swarms of grasshoppers which were dried and ground into meal, formed into small cakes and baked in the sand under fire. He described the Pah-Utes who consumed large accumulations of the larvae of flies in a similar way (Henderson & Harrington, 1914, p. 58). Henderson commented that

> a critical analysis shows that very few [invertebrates] could have been important as a source of food. In this connection the invertebrates may be almost wholly disregarded, but possibly in seasons of unusual abundance grasshoppers may have been a much-relished addition to the bill of fare (Henderson & Harrington 1914, p. 3).

Other sources, however, indicate that invertebrates are a significant food source. Yen (2005) writes that the Australian Aboriginal diet may include a variety of moths and their larvae, various species of ants, scale insects, woodborers, beetle larvae, caterpillars, termites, grasshoppers, crickets, locusts and cicadas while invertebrates used in other parts of the world also include spiders, scorpions, myriapods, and freshwater insects. Ratcliffe (2006) writes that the large family Scarabaeidae, scarab or dung beetles, are known best for their role in the religion or cosmology of ancient Egypt, but are in fact predominantly used by pre- and non-industrial peoples as a food source, particularly the larval stage. Insect products are also consumed, such as the sugary cover of the many species of scale insect known as 'lerps' and the honey of bees. Earthworms are used for fishing, and a range of invertebrates are used for medicinal purposes, such as the treatment of burns and other wounds. The silken bags of caterpillars are used to make a protective dressing over open sores or burns (Yen 2005). In order to exploit invertebrate sources, the behaviour of the invertebrate species, their host plants, how to locate and prepare them, how to ensure the population is not destroyed, and their seasonality all have to be known.

Although it is useful to know which animals and plants can be eaten or used in the pharmacopoeia, it is absolutely essential to know those which can't. Many of our most deadly creatures are invertebrates. Bee-sting allergies and untreated spider bites can be fatal, while various species of fungi are among the most edible as well as the most deadly of plants.

Although it is obvious that bears and lions, for example, attack and kill, many deadly creatures are reptiles, amphibians or invertebrates and may look similar to harmless related species. The discovery of which species are dangerous and which are benign is a task which takes many generations, with accurate identification being a vital survival skill.

Knowledge of plant and animal species may extend well beyond the local area. Over twenty different shell types and a number of coral were named by Tewa informants in New Mexico, although none of these species could be collected in the area. They were used as a medium of exchange, ornaments, amulets, and ceremonial objects. There was considerable trade in prehistoric times by the Pueblo, who travelled great distances in order to exchange goods (Henderson & Harrington 1914, pp. 61-7).

To remember identifying characteristics of a thousand species, along with related behaviour, risks or uses, would be impossible simply as a result of casual observation and instruction when out hunting or gathering. Many species may be observed only rarely, if ever. Identification of a dangerous species must be immediate even if that species has never been seen before. Not surprisingly, ethnographical studies of many oral cultures indicate that natural history knowledge is stored in formal oral tradition structures, while teaching is often embedded in ceremonial, ritual and formal teaching events.

Natural science knowledge is learned

Goody (1977) writes about the African Dogon who not only systematically classify about 300 vegetables, but also many other genres including beings of the universe, stars, textiles, animals and institutions in a system consciously held by the ‘learned men’ (1977, p. 59). In accordance with the pattern of restricted knowledge described in earlier chapters, Goody describes the Dogon classifications as restricted ‘specialised knowledge’, ‘a system of sacred knowledge, *le mythe*’ (1977, p. 60). Essential information is also stored in understanding the relationship between species. For example, Australian Aboriginal cultures used the blossoming of certain plants to indicate the movement of animal species, the spawning of fish or other changes in food resources (Isaacs 1984, p. 22). Massola (1968, p. 113) analysed twenty-three of the very large corpus of natural weather indictors used by south-eastern Australian Aboriginals. About half were related to the behaviour of insects, birds and frogs, the rest being to do with the moon, sun and rainbows. Similarly, Fixico writes about the way American Indians use animal attributes in assessing various aspects of seasons and migrations. The thickening of a horse coat, for example, is used as an indication of the severity of the coming winter (2003, pp. 6-7).

Hunting 'magic'

Rituals performed before a hunt are often referred to as 'hunting magic', the implication being that they may be dismissed as superstitious acts performed in the belief that they increase the fortune of the hunt through the call to supernatural beings. A more serious investigation shows otherwise. Many of the songs reinforce details of animal behaviour and ensure all hunters are acting on the same hunting strategies, thus enhancing the likely success of the hunt. When discussing 'hunting magic' informally with Australian Aboriginal and American Indian people, they indicated that they were well aware of this rational link. The rationality of the songs in no way indicates that they are not also believed to have a magical aspect as well, but it will enhance the effectiveness of the ritual.

Strehlow (1971, pp. 296-327) recorded a series of hunting songs from Central Australia, sung to increase the number and fat reserves of the macropods being hunted. The songs describe the differing behaviour of the kangaroos, euros and rock wallabies, the three species of macropod in the area. Details include the way rock wallabies, flushed from a thicket, will scatter in all directions unlike kangaroos who tend to move as a mob. The songs detail the movement of the ears, indicating whether a kangaroo is at leisure or alert, allowing hunters to assess whether their presence has been detected. Songs and movements replicate the way the kangaroos smack their lips noisily when they feeding, how they grind food, the sound when they are moving leisurely and the way they playfully fight. Songs also include details of footprints and tail prints, both of which can indicate the way in which the animal was moving and thus whether it is merely feeding or has fled a hunter of which it has become aware. The songs also warn of alerting the kangaroos by breaking twigs noisily on approach. Given how wary and timid these animals are, being able to move close enough to spear them is an essential skill.

Further analysis of these songs shows that they also serve as a repository of nutritional knowledge. In a habitat in which wild animals rarely offer fat, and there is no access to dairy products, being aware of the location of animal fat sources enhances health. Strehlow notes that the kangaroo fattening verse was chanted when the animal was being prepared for eating, the time at which being aware of fat resources would be invaluable. The selection of songs given indicate that the fat around the intestines and thigh bone is very rich, while the store of fat on tail can be extracted in a single piece from the tail to the crutch between the legs and around the bladder. The songs indicate which bones are filled with marrow, and how to use each part of the animal. Strehlow also indicates that boulders or stones are used as representations of the animals while mnemonic boards or stones, the *tjuringa*, are used in association with the songs (1971, p. 338).

Spirits of the forest, and other supernatural beings, are often represented as simplistic magical creatures when in fact they may also serve pragmatic purposes. In small-scale society, important decrees are more likely to be obeyed if they come from supernatural sources rather than someone well known to every individual. Fierce forest spirits ensure that children do not wander off into the forest while water creatures ensure they do not swim in dangerous waterways. Murphy (1980, p. 195) describes an experience during his time with the West African Kpelle people. The stream had been low because of the dry season, and people collecting the water buckets were making the water cloudy and creating a community health hazard. The mysterious *namù*, or 'bush devil' made one of its rare appearances in the village, only able to be seen by members of the appropriate secret society. All others must stay indoors behind shutters upon its appearance in a village. Murphy noted that, amid the noise of his entourage made up of Poro secret society members, the *namù* declared that water could only be drawn from the stream by dipping a cup and then pouring the water into a bucket, thus reducing the disturbance caused.

Plants are also linked to magic in oral cultures, however Malinowski makes it quite clear that the Trobriand Islanders are perfectly capable of separating 'magic' from practical work of retaining a garden, describing their answers to questions about soils and cultivation potential as given in 'perfectly reasonable, almost scientific language' (1979, p. 64).

The special role of birds

When reading stories of animals from oral cultures, it soon becomes apparent that birds dominate the animal groups represented. Birds are prominent in traditional lore because they are readily visible and their behaviour so variable. Stories about birds in Australian Aboriginal oral tradition, for example, outnumber those of any other group of animals and contain 'biological information, albeit in a different form from that expressed in Western bodies of knowledge' (Tidemann & Whiteside 2010, p. 177). Tidemann and Whiteside give examples of stories to assess the variety of information they convey, for example landscape formations, weather, tool-making, the timing of egg-laying, plumage colouration, behaviour, habitat separation, cooperative breeding, nest parasitism, species characteristics, species-specific behaviour, visual acuity and morphology along with appropriate cultural behaviour, warnings for children, such as against wandering from camp, and other valuable information such as using urine to clean wounds and covering them with hot ashes (2010, pp. 160-77). Similar examples can be found from oral cultures around the world, but such an exporation is, unfortunately, beyond the scope of this thesis.

Tyler (1979, p. xiii) was able to identify Pueblo names for over 220 species of birds, a very high percentage of the species recorded for the area. Classification and naming may be

linked to the bird call. For example, the Navajo identify numerous birds by their calls, the basis of their bird classification (Wyman & Bailey 1964, p. 20). Calls are easily replicated in song associating the call with the appearance, behaviour and metaphorical role of the bird. The call is also a practical way to identify birds in the field as many birds are heard, even when they cannot be sighted. As a long-term bird watcher, I have struggled with recognition of bird songs except for the common birds that I hear often. Even for common birds, the calls can be confusing. The crimson rosella, for example, has a large number of different calls. The written descriptions in field guides are often of little use. In contrast, the performance mode of oral tradition provides a way of memorising the various bird calls as familiar sounds. In describing the swallow, a culturally significant bird to the Pueblo, Tyler (1979, p. 114) writes that

> it is possible to construct from their clipped and muffled notes a song of great beauty. One such song, recorded from Acoma, set the bird's notes to native words that are so close to the swallow's voice that it can be heard in the imitation.

Calls have many practical uses. As discussed in Chapter Two, many northern cultures use the piercing call of the loon, or diver *(Gavia spp.)* to guide sailors to land when lost in bad weather. In Australia, the Yanyuwa know when to move to winter grounds by a particular crow call and the associated Crow Dreaming stories (Bradley 2010, pp. 35-6). In a similar vein to the discussion earlier of 'hunting magic', Pueblo rituals, held before starting out on a raiding party, include a reminder of the behaviour of a wading plover, the killdeer *(Charadrius vociferus)*, found in the Pueblo territories of the American southwest. As Tyler (1959, p. 144) explains, a war party will need to cross, or camp near, water. When anyone approaches killdeer, the birds let out shrill cries. Thus killdeer can be used as sentinels. Pueblo parties would camp near killdeer, the birds settling down once the war party remained still. Should any enemy approach, the war party would immediately be warned by the cries of the killdeer. The killdeer behaviour is encoded in the dancing of the associated kachina. As will be described in Chapter Seven, kachina are the mythological beings who index and perform much of the Pueblo oral tradition.

Classification is not always based purely on physical attributes, as it is in Western classification. Because of the importance of animals as metaphor for human behaviour, classification may be based on the behaviour which is pertinent to the cultural value of the bird. For example, the birds associated with rain, a critically short resource in the American southwest, are grouped together in the Pueblo classification. They link dove calls with the lack of rain, the dipping and circling of the swallows as bringing the rain and the brilliant

colours of hummingbirds are seen to reflect the rainbows and the flowers which result from rain (Tyler 1979, p. 130). Far away, in the New Guinea Highlands, the Kalam use the movement of the sunrise along a mountain range as their calendar. Majnep & Bulmer (1977, pp. 126-8) describe how that calendar is moderated by the behaviour of a migratory bird from Australia, the *byblaw*, also known as the Bee-eater or Rainbow-bird (*Merops ornatus*). Knowledge of *byblaw* behaviour is stored in story form, and used as an indicator of probable rainfall, hunting success, and when to harvest crops. The *byblaw* first appears in April, but flies very high, where it cannot be seen but is heard. Three or four weeks later, the bird comes down, flying close to the ground, when it is used as an indicator for the start of the dry season, a time of good hunting and plentiful harvest. Sillitoe, in his discussion of taro cultivation in the New Guinea Highlands, describes how the 'series of spells' recited when planting esoterically encapsulated a range of knowledge pertaining to the cultivation of the crop (1998, p. 228).

In an analysis of Australian Aboriginal stories, the most commonly quoted bird were the crows (*Corvus sp.*) followed by the more spectactular Emu (*Dromaius novaehollandiae*), Australian Bustard (*Ardeotis australis*), Brolga (*Grus rubicundus*), Sulphur-crested Cockatoo (*Cacatua galerita*), Willie Wagtail (*Rhipidura leucophrys*) and Australian Pelican (*Pelicanus conspicillatus*) and an unidentified group of eagles (Tidemann & Whiteside 2010, p. 158). In reading ethno-ornithological reports from around the world, it was clear that this pattern of large spectacular birds dominating was, not surprisingly, followed. But everywhere, the corvids (raven and crow family Corvididae) dominated. As the most intelligent of the bird species, and highly adaptable to human enterprises, stories of their behaviour are found across the world (Holzhaider, Hunt & Gray 2010; Marzluff & Angell 2005; Madge & Burn 1994). Well known are the stories of raven from the Tlingit of the American north-west coast. Tlingit social structure is built around matrilineal clans arranged in two ritually opposed avian moieties, the Ravens and the (Bald) Eagles. The central cycle of myths in the Tlingit corpus revolves around Raven, the trickster who helped transform the cosmos and organise the plants and animals into their present forms. Raven's fortunes and misadventures are the basis for innumerable life lessons on livelihood skills, social responsibility and the consequences of selfishness, greed, deceit and violations of the natural law (Hunn & Thornton 2010, pp.183-4).

Case Study: Crocodilians around the world

In the book, *Crocodile: evolution's greatest survivor* (Kelly 2006, pp. 21-66), I explored the relationship between indigenous stories and the behaviour of the local crocodilian species for the twenty-three species which includes crocodiles, alligators and the

gharial living in tropical and sub-tropical waters around the world. These stories represent the public knowledge, often in the form told to children. In all cases, there was a strong link between the behaviour of the specific crocodilian species of the region and the details of behaviour indicated in the story. A single story will not convey all the indigenous knowledge of their crocodilian. It is the collection of stories, songs and dances, along with experience, which form the knowledge bank. Embedded in an integrated knowledge system, an informed person is able to extract the knowledge needed at any given moment. A small sample of the thousands of traditional crocodilian stories are presented here as examples of the way an animal may be represented, and knowledge about it encoded, within oral culture.

Detailed knowledge of crocodilian physiology is essential as hunting the thick-scaled animals is difficult, while some species are deadly. For example, there are Papuan tribes who believe that people eaten by crocodiles can be seen in the eyes of the predator at night. Crocodilian eyes reflect light shone on them at night, thus enabling anyone who needs to go near the river at night to detect the presence of a potentially dangerous crocodile. Stories tell of how to lure a crocodile up river, and then return home cross-country to remove the danger from the area of the village (Kelly 2006, p. 28). A story from the Western Province of Papua New Guinea tells how the names for many body parts of the saltwater crocodile were given (Lawrie 1970, pp. 192-4), thus making naming of body parts easy when discussing hunting and food preparation. The story tells of a family from the crocodile totem, and the collection of a crocodile egg from a nest with only one egg in it. As crocodiles lay many eggs at a time, a nest with a single egg is very rare. The egg was kept, hatched and raised as a pet. When the crocodile had grown, the eleven children released it from the pen, and sat on the various parts of the body to ride the crocodile on the river. The children's names became the names of the body parts of the crocodile[7]. Grown saltwater crocodiles are known to swim thousands of miles in the ocean—the only crocodilian to do so. Eventually, the crocodile took the children out to sea, where they were eaten by crocodiles and sharks. This story obviously acts as a severe warning to children about going near crocodiles, even small specimens which appear to be tame. It also warns them of the dangers of the ocean. With higher levels of knowledge, the behaviour of the crocodile, indicating its awareness of human presence, can be added to the depth of the story. Crocodile eggs are a valuable source of protein, but the behaviour of the females must be closely monitored to detect when the nest can be raided relatively safely. The children's, public version becomes the framework for a much more detailed discussion of the animal as prey, predator, source of eggs, seasonal indicator and basis for metaphor.

The saltwater crocodile (*Crocodylus porosus*) is found in northern Australia, New

[7] The story is reproduced in Appendix B.

Guinea and across the Pacific into Asia. It is one of the few crocodilian species which is capable of killing humans. The story of Pikuwa, the saltwater crocodile, from Northern Queensland (Reed 1993, p. 211) notes the dual fresh and saltwater habitat of the saltwater crocodile, the way in which a male will command a large number of females, the ability of crocodiles to recover quickly from severe wounds and the behaviour of bandicoots in burrows. The story also introduces the concept of digging a well to find water, a skill on which many Australian desert cultures depend. Aboriginal stories distinguish clearly between the potentially deadly saltwater crocodile and the relatively harmless freshwater crocodile (*Crocodylus johnstoni*). Similarly, the Kikori stories, from south Papua, distinguish between the saltwater crocodile and the smaller, harmless New Guinea crocodile (*Crocodylus novaeguineae*), found mostly in freshwater swamps, marshes and lakes. In one creation story, the New Guinea freshwater crocodile is represented as the one who provides food and poses no threat to people. By comparison, a small saltwater might look very similar to a large New Guinea crocodile, live in the same habitat, but needs to be treated as dangerous. Details of the physiology of the animals are encoded into the narrative (John Lever 2005, pers. comm., 5 July)[8].

Each crocodilian species is significantly different in details of its behaviour. Stories of the saltwater crocodile, for example, differ significantly from those of the other major killer, the Nile crocodile (*Crocdylus niloticus*) which is found across Africa. The Nile crocodile will take a dwarf form if confined to small waterways or in captivity. Unlike the saltwater crocodile, the Nile crocodile can be tamed. The warning against befriending a young crocodile, as given in the Papuan story above, will not be found in Nile crocodile stories. Paga is a small town on the border of Ghana and Burkina Faso known for its crocodile ponds. The villagers, including children, wash and swim in the ponds and dams and feed the crocodiles which do not reach a large size due to the limited resources. The creation myth reflects Paga's association with the crocodiles who are consequently protected by the local population.

Many stories from within the range of the saltwater crocodile tell of crocodiles taking girls from a group of women washing at the water's edge (for example, see Terada 1994, p. 135). A crocodile will target the smallest of those at the water's edge, or the one on the outskirts of the group. Humans are a large prey for a crocodile, hence their preference for smaller mammals. A girl at the edge of a group is a more vulnerable prey. The stories act as constant warning for girls to stay close to larger women or be enclosed by the group. Stories of the Indian gharial (for example see Knappert 1992) tell of the relationship between a

[8] This story was related to me by John Lever of Koorana Crocodile Farm, Queensland, on visiting him in July 2005. Lever lived in New Guinea working with the indigenous people for many years, learning crocodile management from the Kikori population.

gharial and a monkey. Within the story is a reflection of gharial behaviour in taking the catch, whether fish or monkey, to their nests or lairs where it is stored, often for days.

Many South and Central American tribes worship crocodilian gods, who are generally associated with fertility and death. The Mayan god Ah Puch took crocodilian form, while Mayan art portrays crocodiles alongside fields of crops or surrounded by water lilies and fish. The region of Guatemala where most Mayan ruins have been found is home to the common caiman (*Caiman crocodilus*), Morelet's crocodile (*Crocodylus moreletii*) and the American crocodile (*Crocodylus acutus*). None of these species are dangerous to humans, so it is not surprising that Mayan mythology refers to them in terms of fertility and food rather than in terms of danger.

The American alligator (*Alligator mississippiensis*) is a large crocodilian, but despite its reputation, is timid and not naturally aggressive to humans. The Native American Choctaw legend of The Hunter and the Alligator (Caduto & Bruchac 1997, pp. 193-4) incorporates details of alligator behaviour, such as the need to rise to the surface to breath and the movement between waterholes when one has dried up. The story notes that the jaws of an alligator can be held closed with a single hand. Crocodilians have extremely strong jaws when closing, but the muscles used to open their mouths are weak. As is common with the integrated nature of oral knowledge systems, the story also tells of the many ways in which a deer may be alerted to the presence of the hunter, such as the alarm call of a jay or stepping on dry leaves. The story incorporates rules for sustaining the deer populations by restricting hunting practices, protecting young does, older does with fawns and young bucks, thus preserving future deer populations.

Plants

Levi-Strauss (1966, p. 4) notes that indigenous cultures are interested in plants which are of no direct used to them because of the way the plants link with animals, including insects. Contemporary hunter-gatherer cultures display immense and intimate knowledge about the plants around them, even those that have no economic value (Mithen 2003, p. 35) as do historically recorded sedentary cultures such as the Navajo (Matthews 1886).

'Gathering' is not a matter of simply going out and picking ubiquitous berries. The Dyirbal speakers of North Queensland, for example, use 30 or 40 common fruit and vegetables, many of which are only made edible by complex treatment, often taking several days and involving a variety of processes (Dixon 1972, pp. 27-8). The Australian Aboriginals ate cycad seeds (*Macrozamia moreii*) which kill rapidly when eaten fresh, hence accurate recall of the methods of preparation and judgement of the age of the seed would have been critical stored knowledge (Hiscock 2008, p. 193; Flood 2006, p. 145).

As is the pattern with oral knowledge systems, plant knowledge is stored within songs and mythology. John Bradley (2010, pp. 197-8) describes the way the knowledge of how to prepare the poisonous cycad into a nutritious food is stored. He talks about the ownership and trading of the songs that deal with the various stages in drying and soaking the cycad nuts, as well as how to care for the cycad palm trees. Given the huge number of plants that are exploited by any given culture, singing of these properties ensures that the knowledge is not lost, or confused between similar species, even through lengthy droughts when a plant may not be available for years. It is for this reason that Strehlow (1971, pp. 284-6) writes of the way Central Australian songs always describe the plants and animals as they appear in a season with abundant rain. For example, he quotes a song which describes the way the flowering tops of the yulka (*Cyperus rotundus*) start to wither when the bulbs below are ready to harvest. For cultures planting domesticates, land fertility is critical. Malinowski (1979, p. 63) interprets the myths of the Trobriand Islanders as 'the gist of the stories about the origins of gardening is an explanation of the excellence of some places and the poverty of others' (1979 , p. 63)

Yankunytjatjara plant use

One example will serve to illustrate the depth of knowledge among a hunter-gatherer people. The book, *Punu: Yankunytjatjara plant use* (Goddard & Kalotas 2002) contains information drawn from stories of the plants used by the Central Australian Yankunytjatjara people, yet represents only a small part of the huge body of oral narrative on plant species retained by the Elders. The translator, Cliff Goodard, noted that 'in written form the stories lack the performance quality that was so much a part of the way they were told' (2002, p. iv). The information includes the landforms and habitats of each plant, how it can be used in food, how to collect, prepare and store it, or sometimes its use in medicine, for utensils or for weapons. Constantly rediscovering which plants are useful, and in what way, would be so time-consuming as to be impractical. Some plants are only used occasionally, in times of resource stress, hence information about them must be retained over longer time spans.

Every part of the plant may be of value. For example, virtually all parts of the manjaṯa (quadong, *Saitannui acuminatum*) are used, either as food, medicinally or as a base for carving. Each part requires different preparation—soaking, washing, grinding or storing. Consequently, a significant store of knowledge is required to cover all the properties and uses of the plants within the travelled region. Many plants are listed as water sources and details are given on how to extract water from roots, stems and leaves when water is hard to find in the desert. One prime source of protein for the Yankunytjatjara is the *maku ilykuwara, maku lunki* (witchetty grub), the larvae of several moth species. Found in the roots of the

ilykuwara (Witchetty Bush, *Acacia kempeana*), the presence of this large white grub cannot be readily detected with a simple glance at the bush. The traditional knowledge quoted includes the life cycle of the grub and how to detect when it is at the appropriate size to be eaten through tapping the roots and looking for cocoon discards.

One of the most revealing examples given by Goddard and Kalotas describes the use of the *minyur*a (desert mulga, *Acacia minyura*). Kanytji, one of the seven Elders involved in the preparation of this book, describes the details of how to identify this uncommon acacia among the similar, but common, species. He then describes the many stages in refining the resin, from identifying a valuable source, stages of scraping, drying on a termite mound, threshing, pounding and finally heating gently over a fire. This resin is then used to make a spear thrower, which may last many years. In a small family band, this is not something which will be done often enough for children to observe regularly in order to gain this knowledge and retain it accurately. It is only through oral tradition, and constantly repeating the stories, that this knowledge can be handed on for when it is actually needed.

The special role of healing

Those required to retain more detailed knowledge of plants used for healing often have a special role within traditional cultures. Knowledge about treating wounds and binding breaks is represented in Western medicine as well as indigenous healing. The properties of plants, such as laudanum as a sleeping drug or belladonna as a poison, are also well known within traditional and Western medicine. Traditional healing results from experimentation and observed outcomes, as does the Western scientific approach.

Stack (1989) writes that the medicinal plants were once known by all members of the Australian Aboriginal cultures, describing the pharmacopoeia which she argues was vast and essential for their survival. It was committed to memory and passed on through example, song and dance. However, other writers describe healing specialists, such as the *gubi* of the Dyirbal (Dixon 1972, p. 28) and the Arrernte traditional healers (Perrurle Dobson 2007), who were selected by the Elders to train in the identification and use of plants and animals in healing. Teaching aids vary from arrangements in leaves and sticks in the ground, through traditional designs to healing songs linked to specific locations in the landscape. Although the infectious diseases associated with large populations are often unknown in small-scale indigenous populations, all humans suffer from a similar range of basic injuries and ailments. For Australian cultures,

> ailments, such as insect-or snake bites, wounds, boils, toothache, constipation and diarrhoea, were treated with bark, roots, leaves or minerals. Paste of ochre heals sores,

> and rich goanna fat soothes burns, and eucalyptus gum salves toothache and dental cavities. Soaked wattle-bark was drunk as cough medicine, gum leaves acted as poultices for snakebite, headaches and boils, and stringy-bark was used as bandages. A common treatment for snakebite was to suck the wound and bind the limb tightly. Cramped legs were cured by ant bite. Wounds were treated with clay or mud. A mixture of powdered white pipeclay, hot ashes and fat was sometimes applied as a poultice, and spider's web could be used to staunch the flow of blood (Flood 2006, p. 146).

The *babaláwo* of the Yoruba people of West Africa are best known for divination, but medicinal knowledge is also encoded in the extensive verses learned (McClelland 1982, pp. 97, 104-114). *Babaláwo* training includes the acquisition of a large repertoire of medical knowledge much of which is recognized as efficacious in western medicine. Calcium is advised for bones, antimony for eye diseases, laudanum for sleep and for mental illnesses, rinrin (*Peperomia pellucida*) is used as an anti-convulsive, *tètè*, a kind of spinach, is used for anaemia while prolonged sleep is used as a stage in many treatments. Sound dietary advice is given in verse. Prescribed diets for diseases may include banana, now known as an excellent source of potassium, while medically sound advice is given for dealing with issues of menstruation and childbirth. Precautions against the spread of infection include separating defecation pits for each member of the family of an infected person, covering waste and washing afterwards. Mental diseases are catered for, too. Depression is described as a period when 'a man is low in spirits all the time' (McClelland 1982, p. 110). It is treated by complicated means which McClelland argues relies 'on the sound principle of distracting attention from the symptoms by giving the patient other things to think about' (1982, p. 110). Hysteria, anxiety, and the treatment of 'a man when he is unable to believe what he sees and hears' (1982, p. 111) are also addressed. Some of the recipes for medications contained drugs that might be hallucinatory.

Ford refers to the spiritual use of psychoactive plants such as Jimsonweed (*Datura inoxia*), peyote (*Lophophora williamsii*), sacred mushrooms (*Psilocybe sp.*), yáhi (*Bannisteriopsis*), and tobacco (*Nicotiana spp.*) (1978a, p. 30). However, it cannot be assumed that hallucinogenic plants are used purely in religious ceremonies. Tyler describes the myth which tells of the powers of *Datura inoxia*, and the way Zuni doctors use *Datura* as an anaesthetic for operations and as a powdered antiseptic for wounds in the American southwest (1979, p. 110).

The Western pharmacopoeia is still learning from traditional knowledge, adapting treatments which stand up to strict double-blind clinical trials. Bladt and Wagner (2007) relate the story of Englishman Charles Henry Stevens, ill with tuberculosis, who sought relief in

South Africa in 1897. Stevens was treated by Kagaitse, a Zulu medicine man, with a boiled root preparation. After 3 months, considering himself cured, Stevens returned to England and marketed the drug for other TB suffers. The 'cure' was labelled as quackery by the British Medical Association in 1909. A century later, the plant has now been identified as *Pelargonium sidoides* (family Geraniaceae), tested rigorously in double-blind trials (see for example Matthys & Heger 2007; Haidvogl & Heger 2007; Schulz 2007), found to be highly efficacious and has recently been developed for use in the treatment of bronchitis and other respiratory diseases.

Animals and plants as metaphor

As is reflected in all the oral traditions explored in research for this thesis, Fixico (2003) discusses the fact that the behaviours of animals are used by American Indians as metaphor within stories to explore human behaviour and social expectations. There are numerous examples which could be quoted to show the way plants and animals are used as metaphor in stories which relate to human social expectations. One example will need to suffice. Murphy writes about the West African Keplle language group, and the need to keep some knowledge secret from enemies

> by using the animal metaphor ' Tree Pangolin' for a person who wantonly reveals secrets. The Tree Pangolin is a scaly anteater, covered with tough scales except for its belly which is soft and white. For defense it rolls up in a ball protecting the vulnerable belly with the timescales. One Kpelle folktale describes how the foolish Tree Pangolin reveals to a hungry leopard the secret of its soft belly. No longer daunted by the tough scales, the leopard proceeds to eat the Tree Pangolin by unrolling the ball of scales. (A proverb captures the theme of this story in a concise form: 'Tree Pangolin showed the leopard how to eat him.') Powerful elders, however, are not Tree Pangolins because they keep a secret knowledge which would show the enemies how to 'eat' them' (1980, p. 199).

Conclusion

This chapter has shown that oral cultures store a depth of natural history knowledge far beyond that which is needed for food and shelter. Although much natural history will be learned simply by watching elders during the daily activities, the complexity of the knowledge stored requires more formal methods to be employed. Through mythology, song, dance and stories, information about animals and plants is structured into a formal knowledge base and is highly valued by the culture. Power is often granted to those who retain this

knowledge. Memory of this knowledge is enhanced by material memory aids, and it is these which may remain in the archaeological record. As will be discussed in Part Two of this thesis, when interpreting prehistoric sites it is essential that the methods for storage and transmission of practical knowledge about plants and animals is given serious consideration. This is especially the case for sites constructed within the last ten thousand years or so, when modern humans were essentially indistinguishable from contemporary peoples in terms of intellectual potential.

Chapter 5 – time and space

Introduction

Beyond an in-depth knowledge of plants and animals, there are a number of other fields for which pragmatic knowledge needs to be retained for the long-term survival of a culture. In this chapter, the focus will be on pragmatic use of knowledge of time and space and the power associated with such knowledge.

Any organised community needs a sense of both immediate and long-term time. For a society to optimise hunting, gathering and farming, there needs to be a calendar enabling seasonal changes to be predicted. What must also be considered is the imperative to conduct rituals which preserve the knowledge system and culture, and gatherings which enable trade, ceremony and exchange of marriage partners. Time-keeping requires that a group of people are maintaining a calendar and alerting others of impending events. It will also be shown that navigational methods need to be memorised, to enable passage through forest, across desert, over ocean or featureless ice when there are no roads, variable weather and constantly changing environments. Astronomy is only one of the navigational tools used. The night sky also serves to inform a calendar and act as mnemonic to mythological metaphor. The need for small-scale societies to enforce marriage laws to prevent inbreeding requires extensive genealogies to be maintained accurately. These same genealogies may act as an index to historical events.

There are other practical considerations which are also stored in oral tradition. For example, Goody (2010, p. 130) describes the Black Bagre of the LoDagaa people as having a loose narrative frame, but the greater part of the recitation describes technological processes such as making iron and brewing beer, along with other aspects of the culture, such as procreation. As described in Chapter 2, Australian Aboriginal songlines tell of stone tool making and the location of resource sites. This chapter addresses the way the pragmatic needs of monitoring time and optimising the use of space are dealt with in oral cultures. As will be shown, this practical knowledge is retained in formal structures and ritualised contexts which ensure not only that information is not lost, but that it is maintained accurately.

Measuring time in non-literate cultures

There is much debate over whether traditional cultures measure time in a purely cyclical mode or not. The Dreaming of Australian Aboriginal cultures

> is a complex network of faith, knowledge and ritual that dominates all spiritual and

> practical aspects of aboriginal life [where] the creative epoch is timeless and cyclic; Western concepts of linear time are alien to Aboriginal thought (Flood 2006, p.138).

Deborah Bird Rose describes the Dreaming as 'everywhen' (1992, p. 217) while Stanner writes that Aboriginal time 'as a continuum is a concept only hazily presented in the aboriginal mind. What might be called *social* time is, in a sense, "bent" into cycles or circles' (Stanner 1979, p. 34). Similarly, time is dominated by a cyclical model based on the cycle of seasons, migration of animals, and movement of the stars and sun, as described for the American Indians (Fixico 2003, p. xii) and Inuit (Bennett & Rowley, 2004, p. xxvii). When Barbara Tedlock was being trained in the ancient Mayan calendar, still retained in oral form by the Highland Maya, she was laughed at when she asked what the first day was, and told there was no first day (Tedlock 1992, p. 97).

However, the many examples of calendar sticks and winter counts discussed below, show that linear and historical concepts of time are also in use in oral cultures. Drawing from Balinese culture, Whittle notes that static or cyclical time was used more in ritual contexts, while linear time was encountered in practical spheres (2002, p.193). As will be shown, genealogies also act as a more chronological measure of time, a record of land and resource rights and, in some societies, an index to the history of the culture.

Vansina (1985, p.128) argues that all cultures use at least two, if not three, of the common concepts of time: cyclical when thinking in terms of the seasons, sun and moon cycles, linear when thinking of the recent past and a timeless eternity when considering the creation stories and the time of the Ancestors. The conclusion gained from reading of concepts of time across a wide variety of oral cultures is that a strong link to natural annual cycles dominates the rhythms of cultural life, yet cannot be assumed to be the exclusive measurement of time.

Time without seasons

For tropical societies where there are no distinct seasons, the 'year' is defined according to the scheduling of terrestrial activities, such as for the New Guinea Tsembaga (Rappaport 1967, p.43) and the Trobriand Islanders (Malinowski 1979, p.55). Rappaport (1967, p. 56-7) writes that the timing of the Tsembaga ritual cycle is regulated by the size, composition, and rate of growth of the pig herd. The occurrence of the year-long pig festival (the *kaiko)* terminates the five- to twenty-year cycle and serves to regulate much of the Tsembaga cultural life. In the Trobriands, the times of the year are named in terms of stages of the gardening cycle, for example *o takaywa* refers to the cutting of the scrub. Running parallel is a system of thirteen months based on moon cycles and five wind seasons

(Malinowski 1979, p. 53-4). The chronological sequence of the years is also defined by gardening activities. By naming every *kwabila* (division of garden land), Trobriand Islanders are able to associate a past event with the name of the two or three fields which were put under cultivation in that year. In this way, they are able to count the years for several decades back (Malinowski 1979, p.55).

Malinowski (1979, pp. 57-61) describes the success of gardening in the Trobriands as being attributed to garden magic *(megwa towosi)* and the special role of the garden magician *(towosi)*, a very powerful member of the community. Magic and practical work are inseparable from each other, although Mainowski argues that they are not confused. The ritual sequence starts with a conference to decide where the garden is going to be made, who will cultivate each plot, and when the work will commence. A ceremony initiates the gardening sequence with the first stage, the cutting of the scrub. Each stage of practical work in the gardens is ushered in by the appropriate ceremony, including a ritual for careful selection of the best tubers for propagation. The *towosi* is considered the garden expert and is constantly studying the state of each garden and of the weather, after which he makes decisions on when to perform the rites which enable the next stage of gardening to proceed.

Time within a seasonal cycle—terrestrial indicators

Beyond the tropics, the need to plan hunting and gathering, or planting and animal husbandry, is dependent on the seasonal availability of resources. Mobile cultures will find the accurate observation of solstices difficult because of the lack of a fixed point against which to watch the sun's movement. Calendars are kept by observing a broad array of terrestrial events, often woven throughout the mythology. Lévi-Strauss quotes examples from oral traditions of North America, Hawaii and Australia as examples of the way in which mythological beings, such as Thunder Bird of the Ojibwa, reflect meteorological calendars and events (1966, p.96). For hunter-gatherers such as the Australian Aboriginal cultures, seasonal availability of food dominates utilisation of time and space:

> They do not wander aimlessly, but to a purpose, and in tune with the seasonal food supply. One can almost plot a year of their life in terms of the movement towards the places where honey, yams, grass-seeds, eggs, or some other food staple, is in bearing and ready for eating (Stanner 1979, p. 32-3).

Rose (1992, p.97) describes the Australian Yarralin annual cycle as integrating observed natural events into a continuous natural calendar: wind directions, clouds, rain and sun strength, the appearance of rainbows, animal migrations, the physical condition of kangaroos

and native turkeys, the blossoming of different eucalypts, tadpoles becoming frogs and the appearance of certain grubs. She notes that the arrival of the black march flies is a far more reliable indicator of the availability of the freshwater crocodile (*Crocodylus johnsoni*) eggs than using the calendar months (1992, p. 225). Crocodile sexual activity, like the arrival of march flies, is dictated by weather conditions rather than calendar months (Kelly 2006, p. 196). Similarly, John Bradley (2010, p.84) describes how Australian Yanyuwa elders note the change in wind and a fast moving giant cigar-shaped mass of clouds as indicators that the wet season is not far away, along with the arrival of migratory animals. The cloud is conceptualised as a road for the *muyu* (migration) of parrots and flying foxes. In contrast, the Scandinavian Saami ritual cycle was linked to the behaviour of the bears, in particular their hibernation and reappearance (Bradley R. 2000, p. 10).

As was discussed in Chapter Three, many American Indian cultures use the first snow of winter as the start of the year. One significant event from the previous year acts as a mnemonic to the history of the tribe for that year, the events stored in stories. The keeper of the winter count, a position of power within the group, chooses the event, such as the Lakota naming the year ‘many died of smallpox’ or ‘30 Sioux were killed by Crow Indians’ (Krupat 1998, p. 131).

Watching the sky – ethnoastronomy

Astronomy is among the prominent genres of knowledge stored by most, if not all, oral cultures and used in many practical spheres. Unfortunately, a detailed examination of the body of research on ethnoastronomy is beyond the scope of this thesis. Generalisations from leading experts in the field will be supported by only a few examples from the wide array available.

Eminent astronomer and archaeologist, Clive Ruggles (1993, pp. 3-4) describes the sky as the only resource within an environment which humans cannot alter. For this reason, all cultures have access to exactly the same resource, and hence we can accurately reconstruct the astronomy another culture is observing. Ruggles argues that astronomy, therefore, permits wide-ranging structural studies of the relationship cultures have with astronomy, the opportunity to draw cross-cultural parallels and to explore the ways in which different cultures interpret and politically manipulate the same ‘immutable database’ (1993, p. 4).

The orderly, cyclical recurrence of astronomical phenomena provides the most reliable measure of the annual cycle of seasons, hence calendars which incorporate both terrestrial and astronomical indicators are documented for cultures as different as the Archaic Greek and present day Maya and Hopi (McCluskey 1993, p. 33). McCluskey goes on to suggest that astronomy is as natural a science for traditional cultures as botany or zoology. He concludes

that the study of astronomy in traditional societies shared the same primary function: the use of the regular motions of the heavens to reckon the passing of time and the changes of the seasons. He argues that this should not be surprising as marking the changes of the season appears to be a universal human activity as all hunters and gatherers need to predict the seasonal appearance of wild plants and animals.

Hayden and Vileneuvre write that 'the major use of calendars among complex hunter-gatherers was not for practical purposes such as scheduling hunts. Rather, the use of calendars was for setting ritual and feasting events (2011, p. 345). It is suggested here that the two primary uses of calendars – to monitor natural resources and to set a ceremonial calendar – are linked. It is important to note that maintaining a structured ceremonial cycle ensures that important rituals will not be forgotten and the encoded knowledge lost.

The Australian Aboriginal system of knowledge about astronomy is held within an integrated cultural context, and has been transmitted through song, dance and rituals over more than 40,000 years (Haynes 2000, p.53). The observed stars are not necessarily the brightest or most obvious. Constellations are not joined into dot-to-dot figures as is the case with Western astronomy, but groups of stars are used to form characters whose stories are told in narrative. Collectively, the narratives form a complex calendar linking celestial events, weather conditions and availability of food sources over the annual cycle. The calendar also dictates the times of social obligations, trade meetings and times to reinforce and teach Aboriginal law (Haynes 2000, pp. 58-60).

> As hunter-gatherers, dependent for their survival on a foreknowledge of environmental changes, the Australian Aboriginals noted, in particular, the correlation between the movements and patterns of stars and changes in weather or other events related to the seasonal supply of food. As might be expected, the significance attributed to these sidereal occurrences varied with the diet and lifestyle of different groups (Haynes 2000, p.64).

John Bradley (2010, pp.161-2) describes aspects of the astronomy of the Yanyuwa people of Carpentaria, quoting the names given to many stars, large and small, within the Milky Way. He also describes the use the movement of the Seven Sisters constellation in short-term contexts, such as to pace the singing of circumcision ritual to end at dawn, and in long term contexts, such as to measure the progress of the cold season. Clarke quotes an early colonist, Dawson, as writing that Aboriginal knowledge of the 'heavenly bodies'

> greatly exceeds that of most white people. Of such importance is a knowledge of the

> stars to the aborigines in their night journeys, and of their positions denoting the particular seasons of the year, that astronomy is considered one of the principal branches of education. Among the tribes between Leigh and Glenelg, it is taught by men selected for their intelligence and information (2003, p.29).

Astronomical knowledge is often maintained in the mnemonic forms discussed in the first three chapters. For example, the Native American Hopi chanted a twenty-verse song specifying which crops were to be planted when the sun reached different points on the horizon (Couch 1996, p.21). The New Guinea Kalam people also track the movement of the sunrise along a mountain range to create a calendar. As discussed in the previous chapter, the Kalam combine the solar observations with the behaviour of the migratory Rainbow-bird to create a calendar for planting taro (Majnep & Bulmer 1977, pp. 126-8).

Sedentary cultures are much better placed to observe solstices than mobile cultures. The two regular events at midsummer and midwinter, enable highly predictable calendars to be maintained. Solstices are used to guide planting and regulate the ceremonial cycle by many sedentary oral cultures, such as the Pueblo (Reyman 1987).

Stone structures and alignments for precise solar solstitial observation are documented for sedentary non-agricultural hunting-gathering peoples such as the Chumash Indians of the California coast, while North American Indian farming groups conduct complex observations, with lunar-solar calendars maintained by specialized ‘skywatchers’ and ‘calendar keepers’, such as in the Pueblo cultures of the American southwest (Marshack 1985, p. 29). More detail will be given on Pueblo astronomy in Chapter Seven. In Part Two of this thesis, I will assume that the role of astronomical observations was, in prehistoric times as it is with contemporary oral cultures, primarily for the maintenance of a calendar in order to regulate hunting and gathering of seasonal resources, to optimise planting and husbandry of domesticates and for organising a ceremonial calendar. The elite role of observing the celestial events and maintaining the calendar is a specialised and powerful role in documented oral cultures, and so it will be assumed was in prehistory.

Timekeeping and power

Societies that developed calendars, enabling fairly precise planning of future events, were more likely to endure than those that did not (Couch, 1990, p. 48). The time-keepers became focal people in the community because they specialised in predicting future sequences of events on which the community depended (Couch 1990, p.155). For example, the Pueblo ‘Sun chief’ or ‘sunwatcher’ controls the calendar, thus making him either equivalent to the chief, or actually the chief himself (Reyman 1987, p.129). However, Couch

argues that time-keepers also expose themselves to the potential of being blamed should crops fail or predicted weather not eventuate. They were thus motivated to construct a monopoly on knowledge for self-protection. The general populace can't criticise what they don't fully understand. This trend to maintaining secrecy of astronomical knowledge can be shown in a wide variety of cultures including the Egyptians, Chinese, Maya, Incas, South Pacific navigators and Native American among many (Couch 1990, pp. 167-8).

We even have some record from the first contact with the British oral tradition in the first century BC/AD. Julius Caesar, and other classical writers described the customs of the Gauls and Britons, including the maintenance of calendars and prediction of future phenomena and events by a priestly class referred to as the Druids (Green 1998, p.190). Caesar reported the presence of the oral specialists who were exempted from military service, taxes and civil duties. 'These pupils are said to learn by heart a vast number of verses. Some, in consequence, remain under teaching for as many twenty years' (Caesar as quoted in Ellis 1980, p. 30). Many of the verses noted by Caesar dealt with celestial phenomena, which is consistent with the Celtic calendar dated from the first century AD. It is important to note that Caesar's observations do not reflect directly on the British Neolithic monuments, the subject of Chapter Eleven. Although it is possible that these were part of the tradition dating back to the British megaliths, as suggested by MacKie (1977, p. 229), this cannot be assumed (Ruggles & Barclay 2000, p.69). Cultures constantly change, so the only link that this thesis assumes over the thousands of years between the observations of Casear and the builders of the megaliths is that the intervening oral cultures will have maintained knowledge specialists who used mnemonic technologies to aid their memories.

Large-scale sedentary cultures–the Highland Mayan Calendar 'day-keepers'

Very little oral time-keeping remains in large-scale cultures. In fact, it is the development of large societies which Lévi-Strauss believes is the precursor to the development of writing (1992, p. 299). We can glimpse the importance and complexity of time-keeping in one large-scale oral culture by looking at the Highland Maya who, unlike the Lowland Maya, still maintain their complex calendar in the ancient oral tradition (Tedlock 1992: 1). Barbara Tedlock was formally trained and initiated in the calendar divination tradition of the contemporary Quiché speaking Indians of Highland Guatemala. Despite the public link of the time keeping to divination, Tedlock objects to the concept 'that the native way of knowing is somehow incompatible with the scientific way of knowing' (1992, p.5).

In Momostenango, where Tedlock trained, the Quiché term *ajk'ij* (daykeeper) is used to refer to the large group of active practitioners who were initiated calendar diviners. The daykeepers maintain the complex 260-day and 365-day calendars which combine to produce

what is called the 'Calendar Round' in the academic literature.[9] Higher levels of power were only possible for those initiated as daykeepers first (1992, p. 47). Substantial payment is required for training—knowledge, as always, is a tradable commodity. A combination of increasingly complex recitation and material mnemonic devices are used. Tedlock describes the way 'the novice is taught a simple divining prayer that is slowly elaborated as his or her knowledge of the calendar and divination grows' (1992, p. 64). In a method remarkably similar to the use of divining cowries and seeds of the West African Yoruba described in Chapter Three, divining seeds are used as mnemonic. Tedlock writes that during training

> the student observes, over and over again, the teacher's method of mixing, dividing, arranging, and counting the seeds. …[The teacher] goes more slowly than he normally would, repeating himself over and over and setting aside divining seeds as mnemonic devices to help the student follow the complex summation (1992, p. 62).

Other mnemonic devices may be used. For example, a marked rectangular board is used as a graphic representation of the Highland Mayan calendar by the Tzotzil-speaking Mayan community of Chamula (Tedlock 1992, p. 92). Tedlock writes that the 'shrines were described by one priest-shaman as "like a book where everything—all births, marriages, deaths, successes, and failures—is written down"' (1992, p. 80). This comment is illuminating. The word 'shrine' gives rise to images associated with Western religions, a place of worship. It is worth re-examining what happens at such places within non-literate cultures to consider the role of the 'shrine' as a knowledge space. As there is no equivalent space in Western cultures, there is no suitable word in English.

Time, space and mythology

As has been a constant theme within this thesis, magical beliefs should not be dismissed as pure superstition, displayed in exotic rituals. The pragmatic aspects of knowledge about time and space are usually part of an integrated knowledge system, with the level of 'magical' belief varying within the community itself. Ethnographer, Nora Chadwick made the case in 1942:

> The relationship of ritual to science and history, and the process by which it deteriorates into magic when divorced from its accompanying tradition, is easily traceable in Polynesia, where our oral records are exceptionally full and well preserved. The *karakias* or chants, which are regarded by the ignorant among the natives themselves as

[9] The mathematical basis for the Calendar Round is provided in Appendix C.

> controlling the weather, are often merely the memoranda of the more intelligent *tohungas*, and enumerate the winds which blow on a certain coast, or the various types of waves which must be encountered on a certain voyage. The so-called magic calabash of the winds, which finds constant mention in the oral traditions, is simply a practical working instrument of combined sextant and compass. Genealogies sung by mothers as charms to their babies owe their origin to the elaborate ritual with which the genealogies are chanted at great festivals held specially for the purpose, such as we find in the Marquesas. But this ritual in its turn owes its origin to the need of the great seafaring people who have no written charters or wills to preserve a sound oral record of their claims and their rights to succession. Their long absences from home, and the chances of death abroad, developed genealogical law into a science, just as in Iceland in the Viking Age, and with precisely similar results (1942, pp.78-9).

Individual stars, as well as constellations, also act as mnemonic structures to other aspects of the knowledge system. The fixed and sequential position of bodies in the night sky offers a perfect structure for the index to components of knowledge. The zodiac is one example where constellations act as a sequenced set of memory loci (Yates 1966, p.116). It is not surprising to find such patterns used as memory loci, characters and metaphor, in traditional cultures, as they are in literate societies.

Massola (1968, p. 106-12), despite his admission that he was not privy to any restricted knowledge, identified 33 constellations and planets and their mythological links from Aboriginal language groups of south-eastern Australia. Within that region, the Boorong people used the story of the Spirit Being, *Marpeankurrk*, as the personification of the red giant star, Alfa Bootis, the most spectacular individual star in the sky in winter. The story tells where to find the pupae of the wood ant (termite), a staple item of diet, rich in protein. The position of the star is used to indicate the beginning and end of the pupae stage in the late winter months of August and September (Haynes 2000, p.64). Manifestation of heavenly bodies may be found in sacred terrestrial sites as well, such as the tall standing stone at Cox Bight in the southwest of the island identified as the star Moinee, who fell to the earth with the creation of Tasmania, according to the Needwonee people of southwest Tasmania (Haynes 2000, p.57).

Navigation

Astronomy is valuable for time-keeping and mythology, but also plays a major role in navigation across many cultures, the information stored in song and mythology (for example see Haynes 2000; MacDonald, J. 1998; Reyman 1987). As is expected, all the oral cultures

explored used astronomical observations in conjunction with a range of other methods to navigate across their land and sea territories, and beyond. Relying solely on astronomical methods would limit travel to clear nights.

If trade occurs over vast areas of land, it cannot be assumed that people could learn the routes by merely travelling them a few times. Turnbull (1989, p. 27) writes that it is possible for Australian Aboriginals to know and navigate unknown and distant territory through knowledge stored in the form of narratives of journeys which can then be taught. This knowledge is not necessarily learnt through going out walking the country, but may be learnt through being taught knowledge of journeys through song. Turnbull (1989, pp. 12-23) also gives examples of portable 'maps', such as the Chippewa Indian land claim presented to the US Congress in 1849, the stick-charts from the Marshall Islands, carved wooden coastal charts which the Greenland Inuit carried in their kayaks and the Australian Aboriginal bark paintings as will be described in Chapter Six. He shows how 'Red Sky's migration chart', drawn on a 2.6 metre birchbark scroll, portrays the migration of the Ojibway Indians in mythical times while corresponding with contemporary Western geographical interpretation.

Within forest or woodland, there must be some reliable way of moving around the landscape, beyond recognising distant mountains or ridges. It cannot be assumed that weather conditions will always permit a clear view of reliable landmarks, while a landscape which is not traversed regularly, will not show clear tracks. Mental maps would need to be stored to safely travel in varying seasonal conditions. It is reasonable to assume that this navigational knowledge involves formal training, as is the case for Australian Aboriginal cultures (Flood 2007, p. 139, Rose 1992, pp. 52-57), American Indian societies (Turnbull 1989, pp. 18-26; Rajnovich 1994; Vennum 1978), the Pacific Island navigators (Farrall 1984; Gell 1985; Gladwin 1970; Lewis 1972;) and the Inuit (MacDonald 1998). McClelland, in her extensive discussion of the West African Yoruba cult of the Ifà, describes how verses include description of the formation of the Benue River, a major tributary of the Niger River in Nigeria. These chanted descriptions describe the river's shallow parts and how much of it is impeded by large boulders and dangerous rapids so that, at some times of the year, it is barely navigable (1982, p. 71).

The curriculum of the Bumbudye secret society of the African Luba people of the present-day Democratic Republic of the Congo included songs which told of regional geography, while in the society's building, the *lukala*, entire walls would be covered with maps which, although not scaled, ranged up to 200 miles, showing major lakes and rivers and the location of local chiefs (Studsill 1979, p. 73). For mobile cultures, maps can be stored in sacred designs. In the introduction to *Saltwater: Yirrkala Bark Paintings of Sea Country*, the indigenous writers state that

> Together the bark paintings form a comprehensive map of the saltwater country … whilst documenting Yolngu culture, knowledge systems, Indigenous rights, law, history, Indonesian contact, animals, fishing, oceanography and climate (Buku-Larrngay Mulka 1999).

Out of the many possible examples to explore in more detail, I have chosen three extremely disparate navigation systems as case studies. Firstly, I have chosen to look at Australian Aboriginal navigation which uses a similar mnemonic technology when navigating through dense forest as it does when plotting a course across open desert. Survival in the desert depends on navigating between rare sources of water. In the second example, the navigation skills of the Pacific Islanders trading between tiny islands separated by vast stretches of open ocean offers a contrast in method and environment, but an underlying similarity in the use of oral and material technologies. Thirdly, the navigation techniques of the Inuit, in environments where landmarks are often obscured by the weather and navigation takes place across moving ice, offers another extreme. In all these, and many other navigation systems I have looked at, the role of mythology as a mnemonic and the use of material memory aids resonates with a familiar pattern.

Navigating forest and desert - Australian songlines

In *Singing saltwater country: journey to the songlines of Carpentaria*, John Bradley (2010) describes how the songlines, or *kujika*, of the Yanyuwa people fixed the cartography of country in the consciousness of the individual. Bradley describes how thoroughly every detail of the land is described and stored in the sung narratives. The following extract from the Rrumburriyi Tiger Shark's *kujika* gives an example of the integrated nature of information stored in the songs associated with each place along the songline.

> We sing this spring waters there in the north and we come ashore at Yulbarra. We come ashore and we sing the people at Yulbarra. We sing the paperbarks swamp and then onwards and northwards we sing the messmate trees and then we climb up onto the stone-ridge country and we sing the cabbage palms, and then we come to that place called Rruwaliyarra and we are singing the blue-tongued lizards and then the spotted nightjar, the quoll and the death adder, and we sing that one remains alone–the rock wallaby–we are singing her, and then we sing the messmate trees (2010, pp. 81–2).

Songlines are also known as Dreaming Tracks (Tacon 1999, p. 42), boundaries or

strings (Rose 1992, pp. 52-7). Sue Churchill describes her experience of navigation by songline in 1983, when searching for Ghost Bats.

> We travelled, different old men from different communities, and ourselves in an old Landcruiser. There were no maps and most of the caves had not been visited for many years. One involved a 100km drive crosscountry through sand dunes to a cave that couldn't be seen if you stood more than 3 metres from its small vertical entrance. The old men who guided us were navigating by the shape of the sand dunes. They would stop every now and then and sing a long song to help them remember the landmarks of the journey. At each new locality the old men would try to tell us (there were some serious language barriers) the Dreamtime story of the Ghost bat, or explain some of the standing stones that were in rings not far from the cave mouths, and sing the songs that they learned as young men. They even pointed out the woman in the story, a large rock on one of the ridges above a cave (1998, p. 22).

Beyond the navigational skills described by Churchill, is the way in which the songlines act as a summary, a set of subheadings, an index to a broader range of knowledge contained in the songs, dances and ceremonies associated with each sacred site along the sung pathway. Australian indigenous mapping is not a plan view of bounded areas, but tracks which connect points on the landscape which become 'webs of connection' (Rose 1992, p. 52). Tacon describes the way different individuals or clans would be responsible for knowing, and caring for, sections of the track with joint ceremonies for individuals of different backgrounds at nodal points along the tracks. Stories associated with the Dreaming tracks may be used to describe human origins, codes of conduct, and the nature of landscapes in their present forms, associated with mythology, such as the most common, that of the Rainbow Serpent (1999, p. 42).

Navigating on the open ocean – the Pacific navigators

Highly organised oral traditions of complex navigational law could be found throughout Oceania enabling the navigators to sail over hundreds of miles of open ocean. The song-poetry not only gave landmarks but also adjusted for wind and current. One Tahitian chant located the North Pole Star, Polaris, accurately although it could not be sighted until the sailor was over 1000 miles north of home. The knowledge was strictly controlled and taught to only a few select members of the community (Couch 1989, p. 596). Navigational knowledge relies on extensive rote memorisation and mental calculations. Material mnemonic technologies are used in association with oral techniques, involving complex mental imaging

studied through the manipulation of stones and stick charts – much of which is learned on land before they set sail (Gell 1985; Hage 1978; Turnbull 2000).

The curriculum includes knowledge of astronomy, the way in which the swells and wave patterns will feel around every different island or reef and valuable information on bird and marine life. Identification by sighting or call of specific sea birds, for example, enables the distance and direction to land at dawn or dusk to be estimated. This knowledge is used for checking location when travelling known routes, for locating land after a storm or if lost, and for exploring beyond known islands (Gladwin 1970, pp. 196-7). Pacific navigators have an immense knowledge of the environment including a detailed fish taxonomy and knowledge of the behaviour of each species (Turnbull 2000, p.150).

Hage (1978) describes the secret and esoteric mnemonic technologies used by the navigators from Puluwat, an island from the Western Carolines in Micronesia. He argues that the apparently bizarre aspects of navigational training are only

> intelligible if they are interpreted not merely as images of spatial orientation but as mnemonic devices for the storage and retrieval of other kinds of cultural information – myths, chants, recitations, spells, etc. If the Puluwatese are able to perform exotic feats of memory, there are common and sound psychological principles which make it possible…. Inter-island travel is in the hands of a class of navigators, *pelu*, who as a result of training which may last several years, possess a formidable store of oceanographic, astronomical, geographical and also supernatural knowledge. This knowledge is a source of considerable prestige (1978, pp. 82-3).

Mnemonic structures consist of points joined by lines, such as the stick chart shown in Figure 3.31. They may also be represented by physical objects placed on special mats during the learning phase. These points may represent real islands, reefs and banks, or points of imagination, such as non-existent islands or fantastic creatures placed in the spaces within the islands. Likening the technique to the Method of Loci, Hage (1978) describes the way an animal or mythical hero is imagined moving along the course. The narrative includes information about real animals, such as the frigate birds, locating them in rough water where they are known to be found. The memorised course serves as an index to using the stars and physical places in the ocean for navigation, while also forming an interwoven mnemonic for the Puluwatese mythology. Gladwin (1970) also details the Puluwat curriculum, but with emphasis on the star charts and the *etak* (the way of dealing with swells), also learned though the arrangements of stones on mats and linked through mythology.

Other material mnemonic methods are also employed. On the Gilbert Islands, a stone

structure is used for navigational training, as shown in Figure 3.32. Depending on the concept being explored, the ‘stone canoe’ can represent an island or a canoe. The stone teaching device is aligned astronomically to facilitate learning about the stars, bearings being taught in terms of rising and setting points of navigational stars, with students sitting on the rectangular stone in the centre as if in a canoe. Stones within the structure represent major swells from different directions and the way they are refracted by land. Other stones represent waveforms and the interference patterns when waves are mixed. Mythological aspects of the knowledge system are also integrated into the structure (Lewis 1973, pp. 185-6).

Navigating on featureless ice – the Inuit

> Reliable wayfinding is an essential element of Inuit culture. Simply put, survival depends as much on locating and killing animals as it does on returning safely home with a product of the hunt. Understandably, Inuit place an exceptionally high value on the skills that enabled them to move efficiently around their territory. Stories recounting feats of wayfinding under extreme conditions are legion across the Arctic. A good navigator is quietly revered, a poor one gently ridiculed.
>
> The impressive, almost uncanny, ability of most Inuit hunters to find their way accurately over vast areas of frozen, seemingly featureless, terrain in virtually any weather, has long amazed and puzzled European visitors to the Arctic (MacDonald 1998, pp. 160-1).

The description of Inuit navigation given here is drawn from MacDonald (1998, p. 160-87). Multiple methods are combined to optimise navigational skills. These methods include wind direction, the set of snow drifts, landmarks, sea currents and floating seaweed, cloud formations and movement, atmospheric effects, astronomical bodies along with the behaviour of sled-dogs and other animals, such as the walrus *(Odobenus rosmarus)* and loons *(Gavia spp.)*. Although useful, a navigational system entirely dependent on observing the stars is not practical as stars are frequently obscured by cloud, fog or blowing snow and, for almost 5 months a year, lost in the daylight of spring and summer (1998, p. 173).

Much of the knowledge is encoded in mythology. MacDonald quotes Iglulingmiut elder, Noah Piugaattuk, as identifying ‘the true purpose of celestial mythology is to teach Inuit how to recognise and remember the stars so that they can be properly used for navigation’ (1998, p. 167). Elder, Hubert Amarualik agreed, adding that the ‘people before us had no writing system so they had legends in order to remember’ (1998, p. 168). Material mnemonics may well have also been used in the past. Along with art, early contact stories tell

of stones being spread on the beach to represent the interrelationship of celestial bodies.

Unfortunately, little of the original traditional astronomical knowledge is now available as all is now intermingled with a Christian view of Heaven (1998, p. 34). The attitude of early missionaries ensured that few of the original stories were rigorously recorded. MacDonald quotes David Cranz, writing for the Brethren's Society for the Furtherance of the Gospel Among the Heathen, in 1767. Having recorded some indigenous stories about the cause of the aurora borealis, among other celestial events, Cranz wrote

> But enough of those absurd stories, which indeed none but the weakest heads harbour even in Greenland. Nay it seems to me that the Greenlanders, who have art enough to veil their craftiness with the curtain of stupidity, have often repaid the relations of the Europeans with such romantic tales, to see how far their sense and credulity reaches, or perhaps to make themselves agreeable to them (Cranz 1767 as quoted in MacDonald 1998, p. 2).

MacDonald does not see Inuit navigation as a rigorous system when he compares it to that of the Polynesian navigators, but also suggests that his opinion may be skewed because of restricted knowledge. 'Inuit elders, invited by the uninitiated to talk about their wayfinding practices, never quite give a fully satisfactory account' (1998, p. 162). However, MacDonald details the various methods used to aid navigation. In higher Arctic latitudes, the sun is often either continuously above or below the horizon, so of little use for indicating direction. Although the complex movement of the sun in higher Arctic latitudes is well understood by Inuit hunters, it is of little use for navigation because when the sun is visible, familiar landmarks can also be seen.

Once on a course determined by other means, Inuit use stars to maintain heading, making periodic adjustments for the star's apparent movement. A more complex method, used particularly when travelling at night or on moving sea ice, involves a thorough knowledge of star and constellation positions in relation to their seasonal and nocturnal rounds, along with adjustments for observer bearings. Considered an essential method when using a dog-team, this method of navigation requires monitoring the movement of the star, with adjustment according to the hunter's speed, along with constant awareness of the passage of time.

In a flat and featureless landscape, snow is the basis of the most used and most trusted navigational key. Snow is formed into drifts of various shapes, sizes, and densities, each leaving a visible and tangible record of the particular wind that formed it. Although most drifts don't last long, those formed by the prevailing west-north-west wind, the *uqalurait,* can

endure throughout the winter and grow to sizes large enough to hinder travel. Encoded in mythology, *uqalurait* are both a hindrance and an essential navigational aid. Hunters can transect an *uqalurait* with a snow-knife and determine the precise angle at which the drift must be crossed to reach a specified destination anywhere within the local region.

Inuit retain an intimate knowledge of their regional topography, in all conditions of weather. Their preoccupation with the physical and ecological features is reflected in Inuit place-naming practices, which reflect the physical, biological, or ecological significance of the land. More than 7000 Inuit place names are listed for Northern Quebec alone. Major journeys usually involved a series of stages marked by predictable, named landmarks: hills, lakes, islands, river bends, raised beaches, erratic boulders, and the light. Occasionally, a stone cairn—*inuksugaq* (pural *inuksugait*) – might signal a turnoff point or the beginning of a land crossing, particularly in the areas lacking distinctive natural landmarks. Ancient routes are still followed, even though they may appear to be haphazard, because they are known to avoid the hazards of thin ice and boulder fields, and make optimal use of local topography and prevailing snow conditions.

Genealogies

Linguist, František Kratochvíl, works with the Abui language group from the central part of the Alor Island in Eastern Indonesia. He discussed the purposes for maintaining genealogies with elders and was told that genealogies are used in property claims, where stories relating the names of ancestral owners need to be told within a group for verification. Secondly, genealogies are used in conflict resolution, enabling relationships to be identified and re-established and, hopefully, the conflict either undone or resolved. The third purpose given for the genealogies is to prevent inter-breeding which is known to cause birth defects (2009, pers. comm. [email] 14 October).

Anthropologist Jan Vansina argues that genealogies ‘are among the most complex sources in existence’ (1985, p.182). Given the value of genealogies to oral cultures, it is not surprising to find them formally chanted in oral cultures across the world. Australian Aboriginal cultures recall complex and extensive genealogies through ceremonial songs which enable relationships to be traced with tribes which may be quite distant. They also served to define land ownership (Isaacs 1984, p. 10; Rose 1992, pp. 110-112). Genealogies are maintained formally by cultures as diverse as the Kope Tribe of Papua New Guinea (Madden et al. 2006) and the Haya of north-western Tanzania (Schmidt 2004, p. 73) while long genealogies are recited as part of rituals in the initiation of the Mayan daykeepers (Tedlock 1992 , pp. 62, 66)

The *Xhosa imbongi* of Southern Africa and the *Griot* of West Africa are oral poets

who continue to hold elite roles in their villages today. They are highly regarded in socio-political manipulations as they maintain the genealogy, sing praises and comment on social, political and historical events (Kaschula 1999). The long narrative of history and genealogy sung by *Griot* (male), and sometimes by *Griott*e (female), can take hours, even days, to sing and require years of intensive study to master (Lott 2002).

As well as spiritual links, totemic animals are used as a means of personal and group identification. The link between totems and genealogies is complex, hugely variable, and well beyond the scope of this thesis. One example will illustrate the complexity. The Australian Gunditjmara culture has two totemic moieties, the Red-tailed Black Cockatoo *(Calyptorhynchus banksii)* and the White crested Cockatoo *(Cacatua galerita)*. Each family and individual belongs to either black or white cockatoo moiety. Within each moiety each person also belongs to one of seven or eight other totems. There are also five different marriage totems. Associated with all totems are laws guiding marriage (Keeler & Couzens 2010, p. 27).

The lists of names may act as mnemonic to events and knowledge from the past, such as in Africa (Hage 1978; Vansina 1985, p.117) and Raratonga (Campbell 2006, p. 109). Across Africa, king lists are structured by the reign of the king, acting as a mnemonic to anecdotes and social lessons associated with each of the kings (Vansina 1985, pp. 166 176; Fentress & Wickham 1992, pp. 80-1). Among the Fang of Gabon and Cameroun, up to 30 generations are remembered in depth giving sequential associations for historical events (Vansina 1985, p.117).

As genealogies are stored in memory and not fixed by written records, they can be adapted to social and political needs. Consequently, elements of historical record which cease to have current relevance are soon forgotten (Goody & Watt 1963).

Material mnemonics

Jan Vansina argues that genealogies are not well retained unless backed up by mnemonic devices (Vansina 1985, p. 24). Various formats from across the world show a similar pattern—objects that reflect a sequence of historical personages. In Uganda, traditional history was transmitted orally, memory being aided by a series of pegs, each named after an historical personage. Children were trained to name each peg and to memorise the traditions associated with each person (Chadwick 1942, pp. 43-4). A ‘learned man’ of the Iatmul of the Sepik River area of New Guinea may remember between ten and twenty thousand multi-syllabic names, each acting as a mnemonic to the songs possessed and their associated mythology. A carved ‘stool’ acts as a mnemonic device (Hage 1978).

Matthew Campbell (2006) writes that the open sacred places, the *marae* of Polynesia

(the equivalent of the Hawaiian *heiau* and the *ahu/moai* complexes of Easter Island) included wooden structures which housed carved figures. These carvings are mnemonics for complex genealogies. Like the *rakau whakapap* of New Zealand Maori, the ancestral figure is at the top of the carving, with each knob below representing a generation. Touching each knob aids memory in the recitation of the genealogy and associated knowledge (Campbell 2006, p. 107). Extremely long notched sticks are used as mnemonic to history by Native Americans (Krupat 1998) and to a great deal of cultural knowledge in southern Nigeria (Kiebel 1990).

Similarly, objects may be decorated with patterns reflecting clan affiliations, such as the Australian Aboriginal weapons carved with geometric patterns that reflect clan relationships and symbolise the ownership of specific tracts of land (Isaacs 1984, p. 14).

Conclusion

This chapter, along with the previous one, indicates the way in which a vast store of essential practical knowledge needs to be retained by oral cultures if they are to survive. Time keeping is essential for optimising use of seasonal resources and also for maintaining the ritual calendar. The imperative is always that the rituals must be performed regularly so the knowledge is repeated to aid retention. Sequence ensures knowledge is indexed and therefore less likely to be lost. Navigational knowledge must be stored if individuals or small groups are to move across the land or seascape without becoming lost. Astronomical knowledge is often employed for timekeeping and navigation, but also for many other purposes including in conceptual metaphors. Integrated with these concepts of time and space are clan affiliations and the requirement of genealogical records to be accurately retained to avoid inbreeding and disputes over land and resource rights. Historical sequences link to genealogies are central to many sedentary cultures.

The mnemonic patterns established in the earlier chapters are constantly repeated for each genre of knowledge being stored. Oral technologies, such as mythology, song, dance and narrative, appear in all contexts. Material mnemonic devices are also evident, their esoteric forms only making sense when the oral component of the knowledge is explained.

It is the essential nature of the knowledge described in Chapters Four and Five, and the commonality of the methods used to store it in memory, that enable the hypothesis to be made that all oral cultures will have use such methods in the past, albeit each in their own way. Although song, dance and narrative will not be found in archaeological record, the performance spaces that they require may. Culturally sequenced spaces and decorated objects which seem to have no obvious utilitarian purpose should be explored in terms of their role as mnemonics within a knowledge system. This hypothesis will form the basis of the analysis in Part Two of this thesis.

Chapter 6 – case study – the Yolngu system of knowledge

Introduction

This chapter aims to illustrate how the argument made in the previous five chapters manifests itself within a specific hunter-gatherer culture. I have chosen the Yolngu culture as a case study because of the recommendation of indigenous people at The Koorie Heritage Trust in Melbourne and the Ngarn-gi Bagora Indigenous Centre at LaTrobe University, who consider the quality of anthropology available on the Yolngu culture to be in keeping with Aboriginal perspectives. The specific items recommended[10] provide the primary resources for of this chapter. The emphasis on visual material was pronounced.

During the past 2000 years, the vast majority of people of the world, including much of Africa, have lived in cultures which were influenced by literacy (Goody 1968, pp. 4-5). Australia was colonised only two centuries ago, while the remoteness of Arnhem Land meant that there was very little contact between Yolgnu clans and Europeans until towards the end of the nineteenth century, and even then most of the enculturation was in western Arnhem Land. After 1918, non-indigenous people needed a permit to enter Arnhem Land which was proclaimed an Aboriginal Reserve, almost 100,000 km^2 in area, in 1931 (Ryan 1990, pp. 1-8). The Yolngu territory in north-eastern Arnhem Land was never settled by non-Yolngu cultures (Flood 2006, p. 134) although Yolngu culture was influenced by several centuries of contact with the people of eastern Indonesia (Morphy 1991, p. 3).

[10] The items highly recommended by the Aboriginal advisors over the course of the research were *Saltwater: Yirrkala bark paintings of sea country: recognising indigenous sea rights* (Buku-Larrngay Mulka Centre, 1999), Howard Morphy's books, *Ancestral connections: art and an aboriginal system of knowledge* (1991) and *Aboriginal Art* (1998), the video recording, *Ceremony: the Djungguwan of Northeast Arnhem Land* (Graham 2006), *Djalkiri wanga= The land is my foundation: 50 years of Aboriginal art from Yirrkala, Northeast Arnhem Land* (Hutcherson 1995), *Singing the land, signing the land: a portfolio of exhibits* (Watson, Yolngu community at Yirrkala & Chambers, 1989), *Maps are territories, science is an atlas: a portfolio of exhibits* (Watson, H & Yolngu community at Yirrkala 1989) and *Spirit in land: bark paintings from Arnhem land in the National Gallery of Victoria* (Ryan 1990). Helen Watson also writes as Helen Verran (1998) and Watson-Verran (Watson-Verran & Turnbull 1995). Also highly recommended were *Archaeology of the Dreamtime: the story of prehistoric Australia and its people* (Flood 2004) and *The original Australians: story of the Aboriginal people* (Flood 2006) for an overview of Australian Aboriginal cultures.

Figure 6.1 Location of Yolngu Country

It is clearly beyond the scope of a single chapter to give a detailed analysis of Yolngu culture. Every culture changes with time, with external influences and with the individuals within it. This brief overview, therefore, can only be a glimpse at the way in which one contemporary oral tradition stores pragmatic knowledge.

A brief overview of Yolngu culture

'Yolngu' refers to a group of intermarrying clans whose members speak a dialect of one of a number of closely related languages. Prior to the establishment of the mission stations, Yolngu clans were widely dispersed throughout north-east Arnhem Land in seasonally variable bands, usually consisting of around 30-40 individuals. Morphy uses the term 'clan' for patrilineal descent groups which acknowledge common ancestry and hold common rights

over land (Morphy 1991, pp. 40-48).

The Yolngu are divided into two exogamous patrilineal moieties—Dhuwa and Yirritja—which are effectively independent of each other and are the primary ordering system of classification.

> The larvae of the horned beetle is Dhuwa, so is the sun. The maggot is Yirritja–so are the crocodile and the moon. Every person, place, constellation, wind, cloud, plant, animal, fish, clan, dance, and song in between has a value in this system. Any Yolngu you meet is from one of these 'moieties' (Buku-Larrngay Mulka Centre 1999, p. 20).

Individuals belong to the moiety of their father and marry a person of their mother's moiety. Critically, the clan shares the same *mardayin* which is translated by Yolngu as 'history law,' 'sacred law,' or simply 'law', and centres around the songs, dances, paintings, and sacred objects. These derive from the actions of the *wangarr,* the Ancestral beings who created the land and the order of the world.

One problem with trying to understand something as critical as the *wangarr* is that we have no equivalent in Western culture and no appropriate words to describe the concept. What is clear is that the *wangarr* cannot be equated with gods. They are not worshipped nor the objects of prayers. Their stories are told and through those stories cultural knowledge is imparted and cultural values sustained. Hutcherson lists 'spirit man' or 'spirit woman', 'ancestor', 'creator', 'totem', and various combinations of these, among some 'of the less than satisfactory English terms used by both Yolngu and non-Yolngu attempting to translate the complex concept' (1995, p. 12). It is simpler to accept the term and describe, granted in simplistic terms, what the *wangarr* did. The *wangarr* travelled through the land, created the plants, animals and topographical features of the country, gave birth to the people, gave them languages, ceremonies, sacred designs and laws and sang the *manikay* (songs) (Ryan 1990, p. 22).

Knowledge and power

> [T]he landscape, knowledge, story, song, graphic representation and social relations all mutually interact, forming one cohesive knowledge network….Yolngu knowledge is a commodity, or a product. You can earn it, trade it, give it and, more importantly, restrict access to it and hence use it as a means of control. It provide[s] the basis for ceremonial power in the profoundly egalitarian Yolngu world. Moreover, the knowledge network is not transparent or passive, it is the real stuff of interaction between groups, and depends for its existence on constant activity, singing, dancing and painting. Through constant

> negotiation everyone knows who is responsible for what part of the knowledge network, who is charged with the care and maintenance of what song, and what land (Watson, H & Yolngu community at Yirrkala 1989, p. 30).

During the ongoing process of initiation, young Yolngu men are taught the scared knowledge, the *mardayin*, through the meanings of the songs, paintings, objects and dances. Morphy describes the acquiring of Yolngu knowledge as cumulative. The content is held within a layered structure, along with the principles of ordering the content and relating layers to one another. Both the content and the organisation of it are equally important in providing a 'free generalised understanding of the world that can be applied to new situations' (1991, p. 77). Morphy writes that through access to a ceremony, the initiate gains the associated knowledge which is then reinforced by repeated participation in that ceremony. Male initiation includes travelling to the ceremonies of distant groups to gain further knowledge. Designs are owned by the entire clan, but the right to paint them is granted to individuals through initiation. The right to produce the most sacred designs remains restricted to the senior male members of the clan (1991, pp. 58-61).

The *mardayin* for each clan is firmly grounded in their territory with their songs, referring to their sacred places. The members of each clan can thus possess rights to a unique set of *mardayin* which overlaps to some extent the *mardayin* belonging to other clans of the same moiety. Ceremonial performances of the *mardayin* at clan gatherings are a matter of agreement (Morphy 1991, p. 49).

The dichotomy between public and restricted knowledge is found across all the oral cultures explored for this thesis. This division is critical to the analysis of monumental sites in Part Two as the division may show up through an exploration of the physical structure of performance spaces. In the Yolngu case, most ceremonies involve performances in multiple locations—publicly in the main camp and at locations with more restricted access. Some activities, such as the revelation of the most sacred objects of a clan, and discussion of their significance, may involve only the most senior males meeting at a restricted location, a *ringgitj* area, where scared objects may also be buried and agreements between members of different clans acknowledged (Morphy 1991, p. 59).

Morphy refers constantly to 'inside' and 'outside' knowledge, translated from the Yolngu terms of '*djinawa'* and '*warrangul'* respectively, which he says can be used to refer to a continuum of more restricted to less restricted knowledge in the interpretations of songs, dances or paintings (1991, p. 78). He writes that 'Inside things are ancestrally powerful and sacred whereas outside things are mundane; inside things are restricted whereas outside things are unrestricted' (1991, p. 79). Morphy also notes that there 'is no absolute distinction

between the sacred and the profane. The ancestral world extends into the everyday world' (1991, p. 80). Magowan lists four distinctions between degrees of public and restricted Yolngu knowledge: secret (*dhuyu*), inside (*djinaga*), open (*garma*) and outside (*waranggul*) (2003, p. 223). The complexity of the degrees of restrictedness within the Yolngu knowledge system is beyond the scope of this thesis, but what is critical is that sacred knowledge is restricted, but not distinct from the pragmatics of the everyday world.

Morphy (1991, p. 95) argues that secrecy within the Yolngu society is clearly related to political power and authority by supporting male control of knowledge. The Yolngu men control the ceremonial ground and manipulate power through ownership and control of the songs, dances, paintings and ceremonies. 'It is this fact – that ceremonies provide the context for acquiring knowledge – that gives power to those who already possess that knowledge and enables them to exercise control over others' (1991, p. 101). Morphy also writes that the division between public and restricted knowledge is not simple as, over time, what was once restricted can become public, and what was once public can be restricted (1991, p. 76).

The dichotomy of speech between that of the restricted knowledge and that of daily speech, discussed in Chapter One, is referred to within the discussions of the bark paintings from Yirrkalla (Buku-Larrngay Mulka Centre 1999). Dula Nurruwuthun, a senior man of the Munyuku clan, has the important title of Djirrikay.

> To have this title requires a specialist knowledge of ritual and law – not only of his own clan's way but of all others, belonging to both moieties of north-east Arnhem Land.… Dula's position as a ritual specialist is evident immediately to those who hear him speak. He speaks with a vocabulary and manner not common to 'everyday' language (Buku-Larrngay Mulka Centre 1999, p. 48).

Although a system of restricted knowledge is a common feature of oral cultures, the implementation varies according to culture and context, as is shown in Morphy comparison between the Yolngu system of restricted knowledge and Barth's (1975) study of the Baktaman of Papua New Guinea (Morphy 1991, pp. 92-4). Like any culture, the Yolngu knowledge system is not stagnant. Yolngu oral tradition can adapt to new knowledge, as has been well documented with the inclusion of the Maccassan trepang (sea cucumber) traders who visited from Indonesia for nearly 300 years, until banned by the Australian Government in 1906 (Morphy 1998, pp. 44; 221; Hutcherson 1995, p. 25). But it is not only new events which are reflected in the changes within the oral tradition. Through ritual, constructing meaning is an active process such that what is learnt in one context about an object, such as a painting, can then be applied to other contexts and objects (Morphy 1998, p. 218).

Oral mnemonic technologies

The following brief overview will show that the Yolngu use the oral technologies discussed in broad terms in Chapter Two. These ephemeral technologies will not survive into the archaeological record, but the understanding of their universality will underpin the assumption that they were also used in recent prehistory. Unfortunately, the conclusion must be drawn that without the oral component of a knowledge system, any attempt to interpret the beliefs of prehistoric oral cultures can only be highly speculative.

Mythology

Morphy (1998, pp. 71-9) writes that Australian Aboriginal mythology displays similarities across Australia, but with regional differences. Ancestral beings are a living part of every aspect of life. They may be incarnate in spectacular unusual natural features or part of mundane, natural everyday processes. The ancestral beings invented the songs, dances and paintings that act as mnemonic to the stories of their life and journeys.

Yolngu stories (*dhäwu*) are often told in song as a means of making sense of the world and everything in it (Magowan 2003, p. 43). As has been noted across many cultures, Yolngu ritual performers take on the identity of the ancestral beings, masking their daily identity with body paint and elaborate ceremonial regalia (Morphy 1998, p. 183). Morphy writes that in Eastern Arnhem Land ceremonial songs are

> concerned with description of the environment and the apparently mundane events of the daily lives of the ancestral beings. The Djang'kawu sisters sang songs that recounted their observations of the world as well as the adventures they had—the rhythm of the waves, the spray from the rough sea, the animals they saw on land and in the sea (1998, p. 88).

The interweaving of story, song, dance, ritual and ceremony

This thesis argues strongly that central to understanding any oral culture is to recognise the role of the stories, songs, paintings and dances in the knowledge system. For the Yolngu, Watson writes that 'the landscape, knowledge, story, song, graphic representation and social relations all mutually interact, forming one cohesive knowledge network' (in Turnbull 1989, p. 30). By using some form of indexing the ceremonies with seasonal events, or regular social events such as births or deaths, the constant repetition of cultural knowledge is assured. The importance of performing the ceremonies within oral cultures cannot be overestimated.

In the Yolngu case, the main context for learning is through ceremony, where people

learn the songs, dances and painting (Morphy 1998, p. 218). Morphy describes Yolngu clan *mardayin*, the sacred knowledge, in terms of 'chunks of ceremonial substance associated with "big-name" places' (1991, p. 101). As only part of the chunk is reproduced at each ceremony, to gain knowledge of the whole an individual has to be present at a large number of ceremonial performances.

The importance of song in the Yolngu system of knowledge is succinctly given in Magowan's observation that both men and women frequently comment that 'Those who sing, "know"' (2003, p. 41). Despite the women's ownership of ritual songs being far less extensive than the senior men, Magowan describes her sixteen months of training with Murukun, the time it took the senior Djambarrpuyngu woman for 'singing her entire song knowledge' (2003, p. 51).

The concept of indexing knowledge through place names, discussed in Chapter Three, is also found within the Yolngu knowledge system. Magowan (2003) writes that Yolngu ritual songs often consist of lists of names. Stories, told as glosses to the names recited, relate the actions of the ancestors at each of the places named. A song cluster works at multiple layers with the ancestral songs, *yindi manikay* (big songs), surrounded by minor songs *nyumukuniny manikay* (small songs). Songs also enable Yolngu to establish and retain local and regional affiliations with close and extended family over a wide geographic area. Without the power of song, Magowan argues, Yolngu communities would lose the coherence enabling communities to interact through a system of obligation and reciprocity.

Morphy (1998, p. 183) notes that complex Aboriginal ritual performances are often operatic in scale, involving a coordination of music, dance, painting, sculpture, action sequences and the incantations of sacred names. The integration of pragmatic and religious knowledge within a large scale ritual performance can best be understood through the exploration of one such ceremony which has been very well documented through the desire of the Yolngu elders to ensure the knowledge is not lost as the culture becomes engulfed by non-Aboriginal Australian practices.

The Djungguwan ceremony

An invaluable insight into Yolngu ceremonies is available through the set of films, *Ceremony – The Djungguwan of Northeast Arnhem Land* (Graham 2006), which combines three Djungguwan ceremonies, filmed in 1966, 1976 and 2002, with interviews and background documentation. The notes accompanying the films indicate that Yolngu elders requested the films be made due to concerns that a true record of the Djungguwan ceremony would not be available to their children and grandchildren unless filmed before the deaths of the older generation, who grew up before the intrusion into their land by bauxite mining. The

ceremony tells of the travels of the Ancestor Wawilak Sisters through Arnhem Land as they hunted, gathered food and made camp, singing, naming and thereby giving meaning to the country and everything associated with it. Yolngu elders use the Djungguwan ceremony to re-enact parts of the Wawilak Sisters' journey, teaching and discussing the law that the Sisters laid down.

Morphy (1991, pp. 85-8) describes the way Djungguwan ceremonial grounds are marked out, songs sung, dances performed and sacred objects manufactured. Various stages of initiation involve the teaching of the knowledge, songs and dances to younger men, some of which can be publicly performed and some of which remain restricted. The ceremony uses highly decorated posts to represent the Wawilak sisters and the associated knowledge. The complex ceremony represents many social, didactic and aesthetic aspects of Yolngu tradition.

Information about natural history is enmeshed in the many-layered fabric of the ceremony. For example, at one level the ceremonial ground represents the structure of a beehive, the white larvae in the hive, and the abdomen of the bee fly. Detecting the parasitic bee fly (family Bombyliidae), which hovers in front of the entrance of a hive, is one of the ways the Yolngu locate honey. The ceremony enacts the way Yolngu gain the honey by chopping down the stringy bark eucalypt with stone axes. On hitting the ground, the tree splits into many pieces, the bees tend to fly off, giving access to the honey. The ceremony talks about using fire to drive wallabies from the forest, and the way spears and spear throwers are used to kill them. The Djungguwan ceremony also acts as a fertility ceremony, incorporates circumcision and serves as a memorial to the dead.

Public and restricted ceremonial grounds are created, the more elaborate public ground having posts (*djuwany*) erected within it. In the video, Morphy describes two trumpets of wood hollowed out by white ants as the main sacred objects, one secret and the other public. He also describes the way young men were taught restricted dances, sacred words and given moral instruction. The adult men spent most of their time on the men’s ground, singing and manufacturing sacred objects. Younger and less knowledgeable members of the group were instructed in the correct way to produce elements of the paintings.

As discussed in Chapter Three, the use of knots as an ordered mnemonic is found across a number of oral cultures. In the Djungguwan ceremony, white feathers are strung between the posts, the string representing the journey of the Wawilak Sisters. It has knots along its length, each knot representing an important site along the path of the journey being enacted in that particular ceremony (Morphy 1991, p. 122).

The importance of acoustics

The importance of acoustics for in aiding memory of Yolngu information is

emphasised by a number of writers. Magowan writes that ‘songs of the landscape and seascape are committed to memory by seeing in sound’ which ‘is critical to effective recall’ (2003, p. 44). She considers that auditory and visual senses are co-dependent for the recall of hundreds of songs which rely on the sounds of ecological images, ‘a form of synaesthesia’ (2003, p. 45).

The song owner, or owners, will usually accompany the song by beating together two hand sticks but there may also be a didjeridu player. The 'didjeridu' is a non-Aboriginal term for wooden instruments, usually made from eucalyptus branches hollowed by nesting termites. The music is evocative, with sounds of the bush and animals often able to be detected. Moyle (1981, pp. 321-3) details the use of the Yolngu didjeridus, which are often made from stringy bark (*Eucalyptus tetrodonta*) or woolybutt (*E. miniata*). Didjeridu song accompaniments are heard as a continuous drone, enhanced by slight pitch inflections, superimposed vocalized sound or overblown tones.

Material mnemonic technologies – permanent

Although it is only through the oral component of a non-literate knowledge system that the content can be known, it is through the material remains that a glimpse of the role of knowledge can be ascertained through the archaeological record. Although the material objects described for the Yolngu are specific to that culture, the following discussion will show that the Yolngu use the wide variety of mnemonic technological forms identified in Chapter Three. This adds support to the assumption that similar technologies were employed by oral cultures in recent prehistory, the basis of Part Two of this thesis.

Landscape as mnemonic

> The landscape created by mythological actions is the ultimate medium for encoding mythological events and does so almost by definition through ordering them in space. The landscape provides a spatial framework for encoding meanings that exist independent of the paintings, but to which all paintings are referable (Morphy 1991, p. 237).

The importance of Country, the landscape and all that is enmeshed within that concept, cannot be overestimated when considering the Yolngu, or indeed any Australian Aboriginal culture. In Yolngu belief, the ancestral beings journeyed across the earth creating a record of their actions in the form of the landscape, songs, dances, paintings, ceremonies and sacred objects (Morphy 1998, p. 84). Clans have rights to particular tracts of land and the

sacred sites within it. Clan designs effectively act as 'title deeds' to specific areas of land (Hutcherson 1995, p. 14), thus becoming symbols of political power (Ryan 1990, p. 4).

For some Yolngu, 'Country' includes both land and sea, areas of saltwater being as important as areas of land. Song cycles include the properties of water flows, freshwater and saltwater species, and how to navigate the ocean as well as knowledge of the species in the various environments (Buku-Larrngay Mulka Centre 1999, p.11, 40).

Songlines

As discussed in Chapter Three, the terms 'songlines', 'singing tracks', 'song-paths' are English language names for the Australian Aboriginal concept of songs, dances and designs representing journeys between sites as groups move across the landscape. More than simply navigational aids, the songlines act as an index to the large corpus of stories encoding much of knowledge system. Songlines intersect, and at such points their significance and interpretation become increasingly complex (Magowan 2003, p. 48).

Verran writes that the words of Yolngu songlines are not memorised as much as performed in ceremonies through a complex set of spatial images which form a 'cognitive map' (1998, p. 248). Magowan describes the Yolngu songlines as condensing long journeys over vast tracts of land into stories which enables an individual to travel from place to place both in practice and in the imagination (2003, p. 44). This is akin to the Method of Loci identified in Chapter Three as one of the most powerful mnemonic technologies known.

Rock art

The ancient rock art cannot be referred to as 'Yolngu', as Yolngu is a contemporary culture, but the art of Arnhem Land can be considered as part of a continuing tradition over millennia, offering an insight unique in the world. Within this thesis, rock art is considered in terms of its value as mnemonic to the knowledge system and a teaching aid. Morphy (1998, pp. 44-6) writes that extant Australian rock art, while displaying great diversity, also shows some remarkable continuities of form in both engravings and paintings. The earliest rock engravings involve geometric forms, such as concentric circles, which occur repeatedly and are found continuously up to the most recent examples. That is not to ague that meanings are stagnant. Morphy suggests that the simpler the form, the more easily the etchings can be replicated and adapted to present meanings.

Painted rock art displays more regional variation, with handprint and hand stencils among the earliest forms. Again there is a long term continuity with geometric forms along with representations of animals and their tracks. Morphy considers the most complete record to be that found in Western Arnhem Land around Oenpelli, a landscape and fauna radically

changed with the inundation of dry land at the end of the last ice age. Morphy describes a sequence of styles over at least 12,000 years as

> almost unrivalled anywhere in the world for its complexity and the information it seems capable of yielding. The paintings themselves record a time of enormous change, during which the landscape of the Alligator rivers region was transformed and new groups were constantly moving into the area (1998, p. 48).

The most recent 3000 years gives a strong indication of the dynamic and regional nature of the art form. During that time, the styles which characterise present-day Western Arnhem Land appear to have developed, a style quite distinct from contemporary Yolngu art in North-eastern Arnhem Land. The style is characterised by the representation known as X-ray art, where internal organs and structures of animals were represented. In Western Arnhem Land, early records of Europeans include x-ray horses, buffaloes, boats with cargo in the hold, and even x-ray guns. Morphy adds a note of caution on interpreting rock art, writing that

> interpretations are very tentative and likely to be only part of the complex history that will never be fully recovered. Part of the difficulty of analysing rock art lies in its very permanence as a record. It is not only the archaeologist who tries to understand the significance of the images, but the artists themselves. Each generation has the potential to reuse and reinterpret the images (1998, p. 54).

It is reasonable to argue, therefore, that interpreting any rock art without the oral component of the knowledge system is highly speculative.

Material mnemonic technologies - portable

Although songs are part of all ritual occasions, they comprise only part of the interwoven methods of preserving the Yolngu knowledge system, the *mardayin*. Portable material objects are also an integral part of the Yolngu way of knowing.

The role of art

Morphy writes that Yolngu art acts as a system of knowledge with restrictions often applying to the context rather than the knowledge itself (1991, p. 76). He describes Yolngu paintings as ‘spiritually powerful ancestral designs which are the property of clans and store information about ancestral events’ (1991, p. 114). They are ‘highly complex set of iconographic and sociological meanings encoded in paintings’ (1991, p. 140). Although

Morphy notes that the Yolngu are aware of the aesthetic value of what Europeans call art (1991, p. 100), to the Yolngu, art is primarily part of the Yolngu system of the ancestral knowledge, encoding meanings about the ancestral past, but also part of the process of creating and communicating new understanding about the world (1991, p. 75).

The following section serves only to illustrate the way in which art is used by Yolngu to aid memory of pragmatic knowledge, a full discussion of the role of art being well beyond the scope of this thesis.

Yolngu artists are quoted in *Saltwater: Yirrkala bark paintings of sea country: recognising indigenous sea rights* (Buku-Larrngay Mulka Centre 1999), a book designed by Yolngu to explain the laws and rights to sea to non-Yolngu through bark paintings.

Dula Nurruwuhun writes that

> By painting these designs we are telling you our story. From time immemorial we have painted just like you use a pencil to write with. Yes we use our knowledge to paint from the ancient homelands to the bottom of the open ocean (Buku-Larrngay Mulka Centre 1999, p. 10).

Art curator, and member of the Bandjalung people, Djon Mundine introduces the book, writing that

> Aboriginal bark paintings are more than just ochre on bark: they represent a social history; an encyclopaedia of the environment; a place; a site; a season; a being; a song; a dance; a ritual; an ancestral story and a personal history (Buku-Larrngay Mulka Centre 1999, p. 20).

Yolngu art is closely integrated with two other key institutional structures: the system of restricted knowledge and the system of clan organisation (Morphy 1991, p. 70). Morphy (1991, pp. 171-81) writes that each area of a clan's land has its own clan design, incorporated into the paintings which refer to the knowledge of that tract of land. Using as an example the diamond infill of one of the Munyuku clan designs, Morphy describes the complexity of the multiple layers of meaning encoded within it. The design is primarily associated with the wild honey (sugar-bag) ancestor, but is also interpreted differently as fire and again as the floodwaters of the wet season. In terms of the wild honey, the pattern reflects the structure of the honeycomb, each diamond representing a cell within the hive. The white, red and yellow hatching represent the grubs, honey and pollen respectively. Black dots represent bees, while

cross-bars remind of the tiny sticks within the honeycomb structure which can get caught in the throat when eating the honey. Along with the design, the wild honey ancestor has its own set of songs, dances, power names and sacred objects associated with it. Even within a single art work, the design elements may encode a multiplicity of meanings, 'for example, a circle can represent a water hole, a campsite, a mat, a campfire, eggs, holes left by maggots, nuts, and so on' (Morphy 1991, p. 167). The specific meanings assigned to the geometric background designs depend on both the context and the viewer's level of knowledge, so a given Yolngu work of art encodes a set of meanings ranging from the public 'outside' knowledge to restricted 'inside' knowledge, the most restricted only being known to senior men (Hutcherson 1995, p. 14).

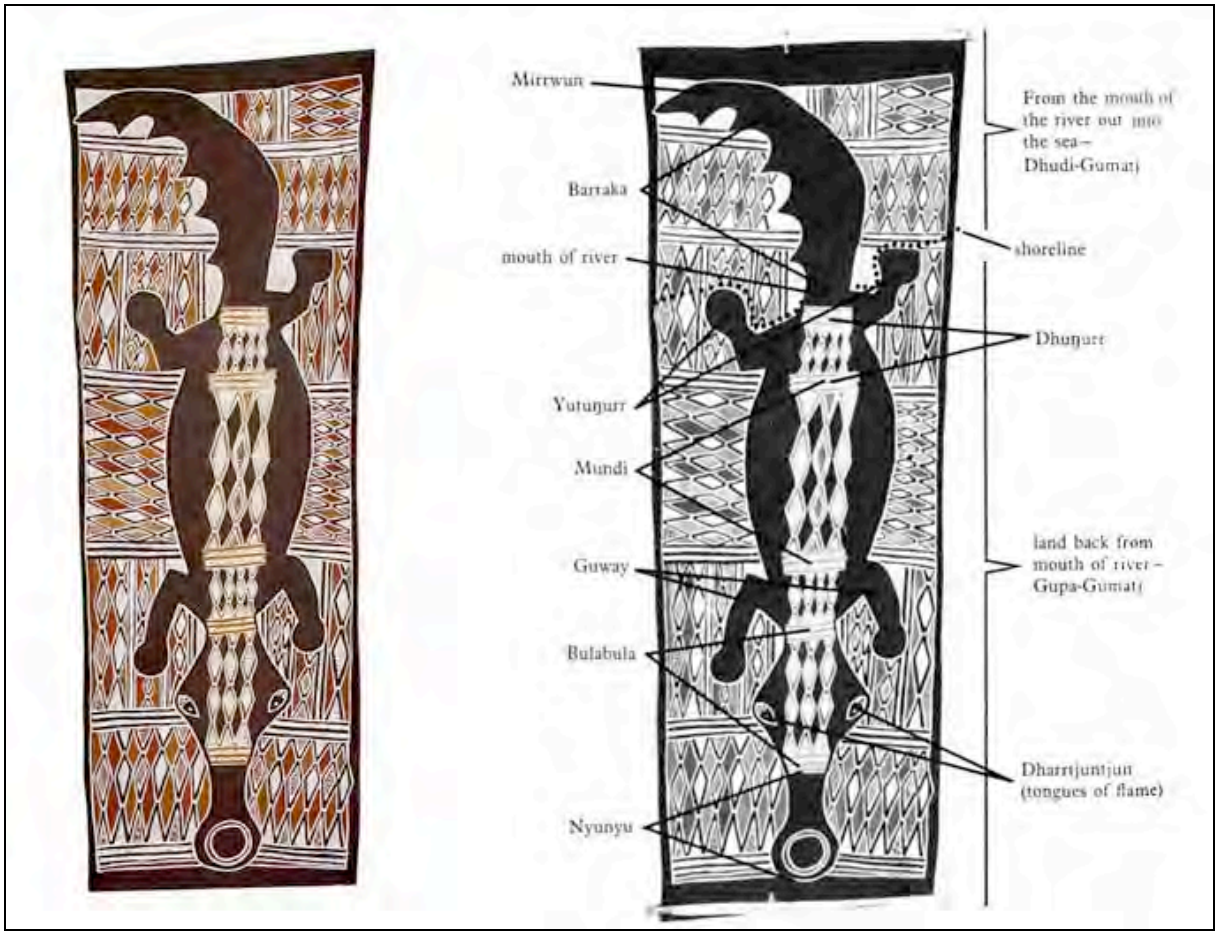

Figure 6.2 Crocodile and fire dreaming; moiety – Yirritja; clan – Gumitj; painter – Djamika Munungurr, 1985. The bark painting 'maps' the homeland of the Gumatj clan. The names of the parts of the crocodile other names of areas of land. From Watson, H & Yolngu community at Yirrkala 1989, p. 32. Permission sought.

Bark paintings are not the only art form which act as portable mnemonics to Yolngu knowledge. Morphy writes that designs on sacred sticks are critical part of corroborees and

other gatherings, representing the ancestral events recreated in performance. Ancestral beings are often represented by objects associated with them – a digging stick or a breast girdle, a canoe or a paddle (1998, pp. 92-4). The sacred objects of the clan, the *rangga*, are representations of the inside and the most powerful manifestations of ancestral beings. The *rangga* are restricted objects, controlled by men, the secrets being kept from unauthorised males and all women by threat of physical and mystical sanctions. The senior man or men who hold the *rangga* become so closely identified with it that they become part of the 'inside' during their lifetimes and may even be buried with the *rangga*. Morphy includes a line sketch of a *rangga* (1991, p. 230), a carved stick with representational and geometric designs. Narritjin, the carver, commented that he included figurative representations only because he was carving in public, otherwise he would have included only geometric motifs. Variations of scared objects occur in semi-restricted or public contexts. For example, there are message-stick forms of the *rangga* which are used to summon people to a ritual associated with the sacred object, or which can be used to give added authority to someone who is mediating in a dispute (1991, pp. 80, 96-7, 230-1)

It will be agued in Part Two of this thesis that apparently non-utilitarian decorated or representational objects may well have served similar roles, that of mnemonic to the mythology or acting as message sticks to summon people to large ceremonies or small gatherings. Most significantly, the archaeological context may indicate the link to power through control of knowledge.

Material mnemonic technologies – ephemeral

It is the constant repetition of knowledge which is essential in an oral culture to ensure that it is remembered. It is not surprising, therefore, to find the creation of ephemeral paintings figuring significantly in the knowledge system of the Yolngu. Morphy writes that Yolngu painting is a ritual act, with the paintings usually destroyed within hours of being produced, buried while hollow log coffins, or created on memorial posts left to decay naturally (1991, p. 21).

Within the ceremonial context, paintings on bodies involve the personal or clan designs linking the individual to associated sacred objects, to the designs on the hollow log for final mortuary rites and to the clan rights in land (Ryan 1990, p. 4). Similarly, sand sculptures constructed during mortuary rites form temporary references to geographical locations within the clan's territory (Morphy 1991, p. 256). Although better known from Central Australia, sand drawings are used in Arnhem Land to illustrate a story as it is being told (Morphy 1998, p. 114).

Plants and Animals

As described in Chapter Four, much of the content of ceremonial songs encodes information about plants and animals, and the human interaction with them. Consequently, references to Yolngu animal and plant knowledge has occurred continuously though this chapter. In Yolngu art, abstract designs are used to represent the animals and their tracks, nests, burrows and methods to exploit the resource, such as how to dig the nests of honey ants (Morphy 1998, pp. 111-13).

Magowan (2003 pp. 44-8) writes that ritual songs cover the entire range of hunting and gathering techniques and practices while stories and songs describe colours, smells and sounds of flora and fauna through the seasons. Each song focuses on the seasonal characteristics of an animal, plant or on natural elements such as clouds, wind strength and direction. She describes the way the Yolngu divide Arnhem Land into five terrestrial habitats: sand dunes, mangroves, open forest, rainforest, and the swamp, all linked to the mythological ancestors and their creation of the land. Within the seascape, songs refer to various aspects of currents, waves and winds. The behaviour of marine life, such as shellfish, turtle, crabs, stingray are included, with details of the movements of birds and marine animals along with their calls. Each ecological zone is the basis for a cluster of songs, the subject of each focussing on one species, their actions and attributes.

Many Yolngu ancestral beings are based on animal forms such as the kangaroo, emu, possum, caterpillar or witchetty grub (Morphy 1998, p. 68). These animal forms may be of animals which are dangerous to humans, such as the crocodile, death adder and many species of shark. Associated dances emphasise the aggressiveness in dangerous situations with enactments, for example, of shark ancestors struggling to escape from a fish trap or the stingray lashing out with its barb after it has been speared (Morphy 1991, pp. 102-3). The behaviour of sharks is encoded in the mythology, including how to know if they are present and how the sharks interact with other animals within the clan's environment (Magowan 2003, pp. 52-6).

One of the ancestral beings whose songline tells of the brackish lake, Djarrakpi, is the koel cuckoo (*Eudynamys orientalis*) whose Yolngu name *guwak* reflects its distinctive call. The description of the call given in a written field guide (for example, Morcombe 2000, p. 194) would not enable me to reliably identify the bird from the call. Morcombe gives the habitat as dense forest margins near water, as is the habitat around Djarrakpi. Having heard, but not seen, this bird in the forest, I can attest to how difficult it is to sight, but is readily identified by call. However, I was dependent on being in the company of a more experienced birder to identify the call. This is an excellent example of the way in which oral tradition,

storing the information of the bird and its call in song, can be a more effective of knowledge base for the reality of identification in the typical habitat of the animal.

There are thousands of plant species in the wide-ranging habitats within the Yolngu lands used in the variety of ways described in Chapter Four. Knowledge of them prevents repeated experimentation to find what is useful, how it can be used and what other species are associated with it. The stringybark trees which hold the sugar-bag honey, for example, are constantly referred to in the Djungguwan Ceremony (Graham 2006). The cumulative information is preserved through song and ritual through the generations. For example, women's songs preserve the methods the Yolngu used to leach and drying the toxic seeds of the cycad palm as a major food source at the Biranybirany ceremonial site (Hutcherson 1995, p. 25) a very similar method to that described for the distant Yanyuwa in Chapter Four.

Time and space

From the discussion above, it can be seen that concepts of time and space, as discussed in Chapter Five, can be found integrated throughout the oral and material aspects of the Yolngu knowledge system. The Yolngu concept of time is not chronological. Mythological events are not considered purely as occurring in the distant past but are also considered to be part of a continuous present (Morphy 1991, p. 45).

Navigation is a part of the mapping of the landscape which, as described above, is imaged in paintings and sung through songlines. Morphy explains a painting by Banapana Maymurur of the Manggalili clan as an example of the way in which many Yolngu paintings represent both a record of mythological events, while offering a map of a particular area of land (1991, pp. 219-25). Interpretations of the painting depend on the gender and level of authority of those present. Encoded in the painting are the journey of the *guwak* (koel cuckoo) as well as the landscape forms of Djarrakpi, the brackish lake surrounded by sand dunes on the coast of the Gulf of Carpentaria mentioned above. Outside interpretations include the listing of the animal species represented by the Ancestral beings and a broad outline of their journey across Arnhem Land, which then serves as a 'map' to the region of the lake.

The detailed description given by Morphy exemplifies the way that Aboriginal paintings are not maps in the European sense, but a description which enables identification of land forms and aids travel through them. It is much more akin to the way instructions would be given to find a location, identifying direction and landmarks along the way, but also with meaning and commentary embedded within the 'map'.

Norris and Hamacher (2009) describe the way Aboriginal astronomy is recorded in songs and stories associated with stars and constellations, the sun and moon. They argue that traditional Aboriginal cultures include a deep understanding of the motion of objects in the

sky, using this knowledge for practical purposes such as constructing calendars. In the past, for example, the Yolngu used the appearance of Scorpius to indicate that the Macassans would soon arrive (2009, p. 13). They write that the Arnhem Land stories explain the relationship between the moon and tides, and why spring tides are associated with the full and new moon, concluding that 'the Yolngu people clearly had an excellent understanding of the motions of the Moon, and its relationship to the tides' (2009, p. 12).

As with all Australian Aboriginal cultures, the Yolngu maintain complex genealogies. Through an identity with place, an individual becomes part of a larger genealogical map of the clan incorporating living and deceased members, which Magowan describes as a 'reconfiguration of people-as-places and places-as-ancestors in the sea and land [which] can be heard in all ritual songs' (2003, p. 48).

Conclusion

This brief description of aspects of the Yolngu knowledge system illustrates the implementation of the restrictive practices and mnemonic forms described in the preceding five chapters. These technologies and social structures form a 'package' used to aid the storage of pragmatic knowledge in an ordered information system. In Chapter Eight, the 'package' will be summarised to form the basis for analysis of the archaeological record of monumental ceremonial sites constructed in the early stages of settlement. Having explored a mobile hunter-gatherer culture, it will now be valuable to look for the way similar traits are implemented in a set of small-scale sedentary farming cultures, the Pueblo.

Chapter 7 – case study: the Pueblo system of knowledge

Introduction

This chapter aims to illustrate how the argument made in the first five chapters manifests itself within a group of small-scale farming cultures, the Pueblo cultures of the North American southwest. This chapter gives an overview of the Pueblo methods for storing, maintaining and transmitting pragmatic information, the gaining of knowledge through initiation, sharing knowledge through song, dance and narrative, dividing performance spaces into public and restricted areas, the existence of material mnemonics and a method by which the knowledge is indexed, and, most importantly, that power is associated with control of knowledge. The depth of knowledge of the natural sciences, as generalised in Chapter Four and Five, is then explored in terms of the Pueblo.

The Pueblo cultures were chosen because they are a well-documented small-scale farming culture still linked to their original lands, while most other contemporary North American Indian cultures have been moved to reservations. Pueblo cultures also offer insight into the Ancestral Puebloan site of Chaco Canyon, the focus of Chapter Nine. Despite constant movement and over 400 years of European contact, Pueblo cultures have maintained much of their oral tradition (Ortiz 1969, p. 148; Reyman 1980, p. 40). A comparison of the knowledge systems within all Pueblo cultures is well beyond the scope of this chapter. There is an emphasis on the Hopi as, due to geography and history, they were the least influenced by contact with European missionaries and settlers (McCluskey 1977, p. 175). Within the New Mexican Pueblos, there is a bias to the Tewa speakers because of the writings of Alfonzo Ortiz (1969; 1972), a native Tewa and anthropologist.[11] Priority has been given to

[11] Ortiz recommends that readers also refer to botanist and anthropologist Richard I. Ford's work as complementary to his own (1969, p. xviii). It is Ford's writing (1972; 1976; 1978a; 1978b; 1980) which offers a rare and invaluable insight into the role of ritual in terms of ecological knowledge. The source material chosen is strongly influenced by the recommendations of Dr William D. Lipe, Professor Emeritus, Archaeology, Washington State University, and consequently that referenced by Tewa speakers, Tito Naranjo and Tessie Naranjo of Pueblo Santa Clara. Material was also recommended by staff at the Indian Pueblo Cultural Center, Alberquerque, New Mexico, where I was able to talk with members of Acoma Pueblo and watch their dances. The massive document, *"That place people talk about": the Petroglyph National Monument ethnographic landscape report*, Anschuetz et al. (eds.) (2002) was given to me by Interpretive Ranger, Diane Souder, and represents considerable input from various Pueblo language groups.

ethnographic reports from the few researchers who have lived in Pueblo villages and learned the language.

As has been emphasised constantly in this thesis, oral tradition is far more than the simplistic child-like stories told in popular compendiums of indigenous stories. Sociologist and native Tewa speaker, Tessie Naranjo, writes that it is 'clear that our traditional knowledge is more than benign or sweet, secular or sacred stories, or that it merely constitutes elements of the superstitious worldview' (2008, pp. 251-2). Her brother, Tito Naranjo, writes that '[t]otal unfamiliarity with writing has pervasive implications in understanding the psychodynamics of the people and their Being' (Varien, Naranjo et al. 1999, p. 299). It is the 'pervasive implications' of primary orality, in particular on the pragmatic and scientific aspects of Pueblo oral tradition, which form the basis of this chapter. That focus is not to deny the significance of religious beliefs to Pueblo peoples.[12]

A brief overview of Pueblo cultures

Although there are many commonalities between the various Pueblo cultures, there are also significant differences. The language group is considered the most stable characteristic with which to identify the sub-groups of the Pueblo (Hawley 1937). The nineteen New Mexican pueblos are represented by the Indian Pueblo Cultural Center, Albuquerque. The following list is taken from their displays, when visited in November 2009. Explanations were greatly informed by discussions with Pueblo staff.

Keres speakers: Acoma, Cochiti, Laguna, San Felipe, Santa Ana, Santo Domingo and Zia Pueblos.
Jemez speakers: Jemez Pueblo.
Taos speakers: Taos Pueblo.
Tewa speakers: Nambe, Ohkay Owingeh (formerly San Juan), Pojoaque, San Ildefonso, Santa Clara and Tesuque Pueblos.
Tiwa speakers: Isleta, Picuris and Sandia Pueblos.
Zuni speakers: Zuni Reservation.

The Arizona Pueblo are Hopi speakers. The Hopi Reservation is entirely surrounded by the Navajo Nation lands.

[12] The writers on the religious perspective of Pueblo oral tradition which informed this thesis were particularly Ortiz (1969) and Naranjo (2006) on the Tewa, and Titiev (1972) on the Hopi, as well as Cushing (1986 [1931]), Fewkes (1892; 1895; 1897; 1898; 1901; 1902), Parsons (1923; 1929), Steward (1931) and Tyler (1979).

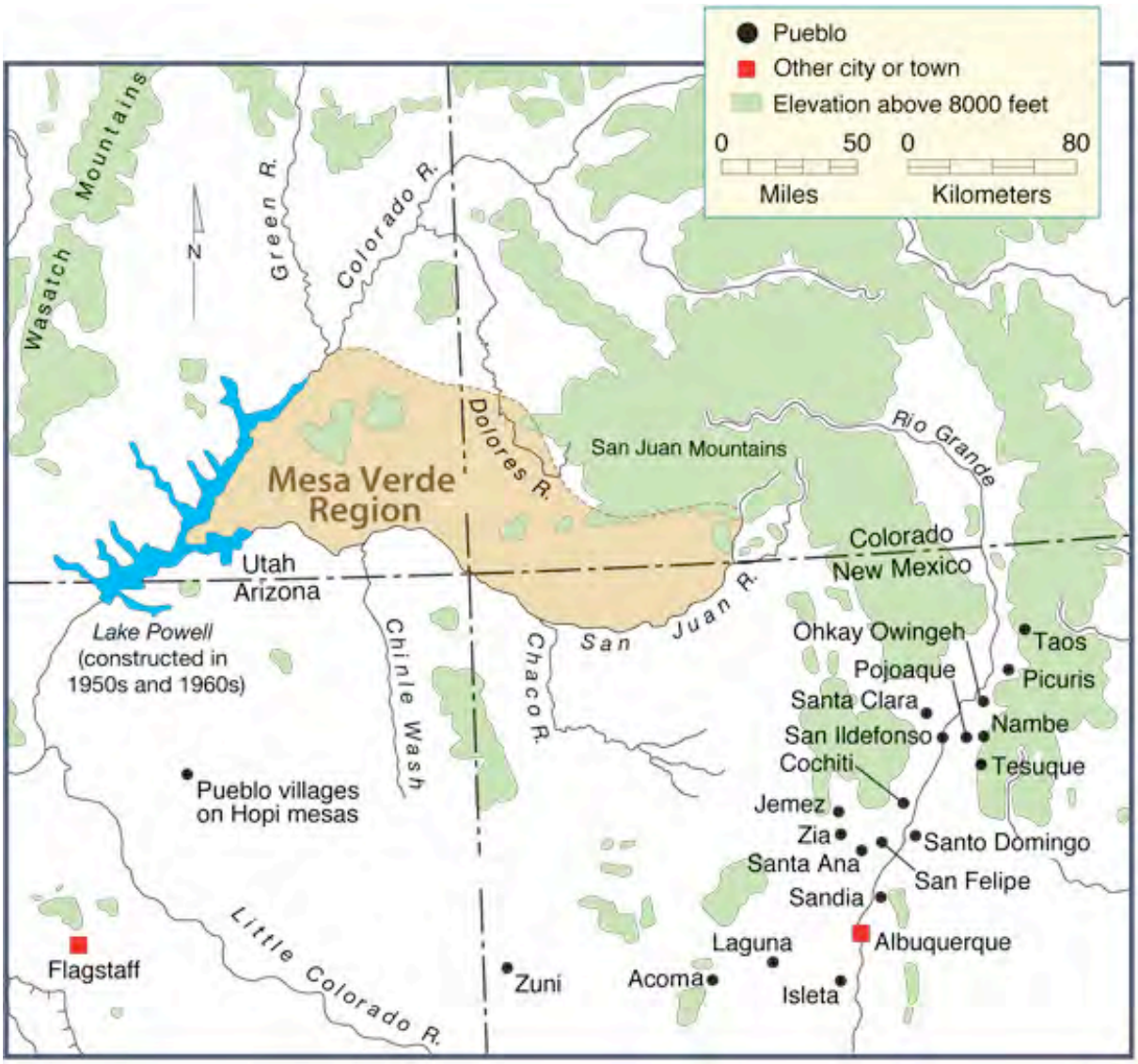

Figure 7.1 Map of Pueblos, Lipe and Hegmon (1989). Reproduced with permission.

The social organisation of the different language groups vary, but all involve a hierarchy of restrictive societies, as seen with the Tewa. The Tewa origin myth (Ortiz 1969, pp. 13-15) tells of the first mothers, The Blue Corn Woman, or the Summer mother, and White Corn Maiden, the Winter mother. On emergence, the Summer People subsisted by agriculture and gathering wild plants while the Winter People subsisted by hunting, creating the division which still dominates all Tewa social constructs.

The Winter Chief and the Summer Chief each take charge of the village for half the year, from equinox to equinox. The Tewa distinguish between the ordinary people, known as the Dry Food People, and the religious leaders, which Pueblo writers refer to as Made People. Mediating between the two groups and guarding the ceremonies of the Made People are the *Towa é* (Eggan 1969, p. xiii-xiv). Ortiz represents these three human levels along with three corresponding supernatural levels, giving six Tewa Levels of Being:

6. **Dry Food Who Never Did Become** (the supernaturals impersonated by the Made People)
5 ***Towa é*** (supernaturals impersonated by the human *Towa é*)
4 ***Dry Food Who Are No Longer*** (the souls of Dry Food People after death)
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3 **Made People** (adults initiated into the highest order)
2 ***Towa é*** (the core of the political organisation)
1 **Dry Food People** (common Tewa who serve in no official capacity)

(adapted from Ortiz 1969, p. 17)

The annual ritual cycle is planned and directed by the Made People, executed by the *Towa é*, and participated in by the Dry Food People (Ortiz 1969, pp. 79-80). Ford writes that the Made People go through long training period and are seen as mediators between spiritual and human worlds. However, the power of the Made People is moderated by the six male *Towa é*, one year appointments of Dry Food People, three from each moiety (1976, p. 148). By impersonating the masked supernaturals, the *Tsave Yoh*, whip anyone they consider to have been disobedient during four days at the winter solstice. Crucially, this includes Made People. As no one knows the identity of the *Tsave Yoh*, they can whip with impunity (Ortiz 1969, pp. 72-7).

The Made People are then further divided into eight secretive societies which form a hierarchy. At the top are the societies for each moiety, Summer and Winter. The Bear People form the very powerful medicine society. Beneath them are two clown societies, *Kwirana* (cold clowns) and *Kossa* (warm clowns). Then follows, in order, the Hunt, Scalp and Women's societies (Ortiz 1969, p. 81). There is a great deal of complexity associated with the societies of the Made People. However, for the purpose of this thesis, interest is in the existence of a set of restricted societies and their role in terms of the knowledge system and the power structure.

Pueblo rituals are conducted in various locations within a village, but kivas and plazas are most often used for important group rituals or ceremonials (Hegmon 1989, p. 10). Kivas are subterranean ceremonial rooms found in contemporary and ancient Puebloan villages, the location for the performance of secret rites (Titiev 1972, p. 44). The kivas are often referred to as religious rooms, but they also serve in a much broader social context. Titiev reports of Hopi men playing poker in the kiva (1972, p. 36), weaving (1972, p. 86) and gossiping (1972, p. 106) while Ford (1980), as will be detailed below, explores the way rituals in the kiva are used to select corn and ensure varieties are kept pure.

Knowledge and power

This thesis argues that in small-scale oral cultures, power is afforded to those who control the knowledge, including the pragmatic knowledge on which survival depends. ‘The possession of ritual and ceremonial knowledge is the most powerful instrument in the acquisition of pre-eminent position among modern Western Puebloan society’ (Upham 1982, p. 199). Similarly, secrecy within Tewa sodalities, often referred to as religious or medicine societies, is ‘the essence of their power and authority’ (Ford 1976, p. 144). Tewa native, Tito Naranjo explains

> Knowledge of ritual and ceremony belonged to moiety societies, and non-society members were not allowed to have and use knowledge, which was thought to have power and could be used only by the society (Varien, Naranjo et al. 1999, p. 401).

In a detailed paper on the link between power, politics and ceremony, Reyman (1987) argues that Native American cultures are non-egalitarian despite the lack of obvious personal wealth. Rank, although often hereditary, is dependent on ceremonial knowledge, character, interest, skill in oratory, intelligence and the ability to memorise long, difficult chants. Access to knowledge is restricted and maintained through institutionalised secrecy. Power is particularly invested in the person who watches the sun and therefore controls the calendar. A ‘sun-watcher’ who appeared to be very successful could receive considerable material benefits, such as the working of his fields by villagers, long-term food supplies, meat provisions from special communal hunts, a building or room to carry out his duties, one or more assistants and extra land (Reyman 1980, p. 49). However, individual power is moderated. As Ortiz explains:

> Among the Tewa the awareness of more general considerations is restricted to only a reflective few, usually Made People, in each village, and no one of these is aware of more than a portion of the entire system of knowledge presented here (1969, p. xvi).

Brandt (1980) writes that knowledge is retained in narrative form, chant, or in visual or gestural symbols requiring a long period of training involving formal memorisation of a large corpus of material communicated to initiates in highly structured verbal narrative forms such as myths or prayers. In order to retain the high level of secrecy, performances of ceremonies in kivas, society houses and shrines are restricted, ritual language is used, while misleading responses may be deliberately given to questions from outsiders.

> The Old People have a firm grip on the society through control of the secular political system, which their access to knowledge gives them. Through secrecy they can invoke dire but unnamed supernatural sanctions on the rest of the population. They can ban anything they wish without the necessity for explanation by invoking secrecy. The *lulina* are the judicial system within the village and the legitimate agents of social control with the power to fine, imprison, whip, or expel anyone who threatens their authority…. Secrecy is thus an internal political tool of great utility (Brandt 1980, p. 142).

Acoma religious leader, Ron Shutiva, confirmed that restricted dances and chants encoding knowledge are still performed constantly by men who go aside at night and 'use language that women would not understand if they heard it anyway' (2009, pers. comm., 24 October). Brandt argues that 'Oral transmission of religious information provides a high degree of control over information impossible with any other system of data storage and retrieval (1980, p. 134). She concludes that '[i]n a very real sense, knowledge is power' (1980, p. 143). However, it is critical to note that there is no individual with overall power. Lipe writes that

> having multiple centers of ritual knowledge, as in Pueblo society, may actually have an integrative function if several individuals or groups are required to use their special knowledge to ensure the success of larger ceremonies. That is, the society may be dependent on each of these groups using their specialized knowledge in ways that benefit the group, but there is no overall central power that can require them to share that knowledge (2010, pers comm., [email] 11 January).

A program of initiation and teaching into the formal knowledge system was described in Chapter One as a component of most, if not all, oral cultures. Pueblo cultures conform to this pattern. As was also described as a general pattern, knowledge is traded. Tewa parents select a sponsor for each child, who instructs the child in exchange for items such as wood or flour (Ortiz 1969, p. 38). Titiev noted a similar process for the Hopi of Old Oraibi (1972, p. 73).

The kachina cult

The way in which Pueblo cultures index knowledge and represent the mythological components is extremely complex and, unfortunately, beyond the scope of this thesis.

Informal discussions with Pueblo people in Albuquerque, both at the Indian Pueblo Cultural Center and among Pueblo artisans, indicated that the 'kachina cult', as it was constantly referred to, is the most accessible way to gain an insight into the way in which Pueblo knowledge is structured. As the kachina (also spelt katcina, katchin or katsina) are so well documented from the time of early European contact, they will form the example of the way in which some aspects of formal knowledge is indexed, stored and transmitted in Pueblo cultures.

Colton explains that many Pueblo Indian cultures, in particular the Hopi and Zuni, structure a great deal of their knowledge system around ceremonies involving kachina, supernatural beings who live in the San Francisco Peaks, Arizona, and the other high mountains. The kachina are impersonated by masked men who are taken over by the spirit of the kachina (1959, p. 1). In public restricted ceremonies, the various kachina dance their stories which are told in song accompanied by musical instruments including drums and gourd rattles (McCluskey 1977, p. 177). The songs encode the practices which form the 'corn lifeway' of the Hopi, a culture dependent on corn for survival; 'texts of *katsina* songs reinforce the unremitting nature of these practices' (Sekaquaptewa & Washburn 2009, p. 202).

Each Hopi village divides its year into a period extending from late November to early August, when kachinas may appear, and the rest of the year when they may not (Titiev, 1972, pp. 5-6). Reflecting the shared leadership pattern, the Hopi Kachina society chief has charge of kachinas in the summer while the *Powamu* society chief, has charge in winter (Titiev 1972, p. 35). During the series of winter night dances following the *Powamu* ceremony, each kiva group in the Hopi villages impersonates a different kachina type (Titiev 1939, p. 95).

Colton (1959) describes 266 Hopi kachinas, but also makes it clear that there is not an absolute number as the kachina culture varies between individual Pueblo villages, even within the same language group. New kachinas are created, sometimes representing respected people who have died, and others gradually fade from the pantheon through lack of appearances. The major ceremonies last nine days and are performed predominantly in the kivas, restricted to initiated members. In public ceremonies, the kachina perform in the plazas. There may be twenty to thirty identical kachinas dancing together, or there may be a mixture of kachinas wearing different masks and costumes. All dances involve friends and relatives from neighbouring villages socialising and feasting. Clown kachinas perform during intervals of serious ceremonies, giving comic relief. There are also female kachinas who are always impersonated by men (Colton 1959, pp. 2-8).

By having a strict sequence of events, the knowledge encoded in the performances is structured through the stories associated with each kachina. For example, the Yellow Flower

Kachina is linked with medicinal knowledge, recorded in stories and impersonated giving out medicine in Kiva ceremonies (Ford 1976, p. 149). With the flexibility to create new songs, and even new kachinas, along with losing those which are not regularly performed, the knowledge system is adaptable to new information.

Figure 7.2 Painting of Hopi kachina dancers in a modern, rectangular kiva. © Ray Naha - Kiva Kachina Dance, Image with permission from First People, www.firstpeople.us.

Kachina also contribute to social order, effectively part of the legal system, similar to the *Towa é* of the Tewa. For example, Masau'u, who patrols at night, 'seems to be some sort of Hopi bogeyman' (Titiev 1972, p. 39). A skeletal figure associated with death, Masau'u is the only kachina who does not go home at the Niman Ceremony and so may appear at any time of the year (Wright 1999, p. 254). The hunch-backed flute player, Kokopelli / Kokopele, is widely represented in the southwestern pueblos (Titiev 1939, p. 94). Titiev notes that Kokopelli is associated with phallic or erotic themes (1939, p. 91) and describes a kachina dance with six masked Kokopelli dancers entering the kiva and lunging at the spectators, particularly the women. Singing a slow song, they advanced on the audience, causing great hilarity. Kokopelli was described to him as the kachina who sends babies (1939, pp. 95-6).

It is likely that a significant proportion of knowledge of the kachina has now been lost due to enculturation, such as the knowledge of Kokopelli, whose performances were considered obscene so that restraints were imposed by the American government (Titiev 1939, p. 98). This is particularly sad because Kokopelli can be seen in ancient petroglyphs. This does not indicate that the symbolism has remained static over the centuries but that the

imagery has persisted.

Figure 7.3 Petroglyph of Kokopelli petroglyph, Embudo, NM USA. Photo: Einar Einarsson Kvaran. Used under the Creative Commons Attribution-ShareAlike License.

Not all dances are kachina dances. The buffalo dance, for example, is a public dance with the timing of performance fairly casual (Ortiz 1969, p. 169.) Consequently, it is the buffalo dance that is often performed for non-Pueblo audiences, such as I witnessed at the Indian Pueblo Cultural Center, Albuquerque.

Figure 7.4 Pueblo Buffalo Dance performed by dancers from Acoma Pueblo, New Mexico. Photograph: Lynne Kelly.

Mnemonic technologies – oral

Mythology

It was argued in Chapter Two that mythology works as a mnemonic technology because vivid stories are much easier to remember than unrelated facts. Native to Santa Clara Pueblo, sociologist Tessie Naranjo talks about 'the stories that we tell in our songs, dances, and other dramas' (2006, p. 56) being much more based on metaphor than on literal meaning. She quotes a Tewa Elder as saying that 'We performed the dramas to remind ourselves because that's one way that we could teach…. As villages and pueblos were developing, then we built myths, and myths are all that we have to live by' (2006, p. 56). Naranjo again refers to the concept of building myths when she writes

> People have moved from place to place and have joined and separated again throughout our past, and we have incorporated it into our songs, stories, and myths because we must continually remember that, without movement, there is no life (1995, p. 250).

Some myths act to structure the corpus of mythology, as unstructured information is likely to be lost. Just as the Australian Aboriginal songlines, described in Chapter Six, sing a sequence of landscape places which give sequence to the stories, so do origin stories of Pueblo cultures. Ortiz describes the Tewa origin myth as representing a ‘charter’ which he describes as ‘a skeletal outline to which the details must be supplied by reference to ritual, prayers, and other types of symbolic action’ (1969, p. 121). The origin myth dictates the order of ritual and social relations, giving a reliable sequence to these activities (Ortiz 1969, p. 84).

As has been argued throughout this thesis, ritual often has a pragmatic role, critical to survival. Ortiz (1969, pp. 98-111) describes the Tewa annual cycle defined by the summer and winter solstices and the autumnal and vernal equinoxes, which he firmly ties to the natural cycle of plants and animals, hunting and agriculture. The ceremony transferring authority from the Summer chief to the Winter chief instigates economic activities such as the storage of cultigens, gathering of the remaining food by needy families, releasing livestock into the fields, closing of irrigation canals and associated fishing, and preparation for annual migrations of animals, in particular, birds. Members of the Women’s Society direct the cleaning of ponds on the outskirts of the village to ensure nearby supply of fresh water.

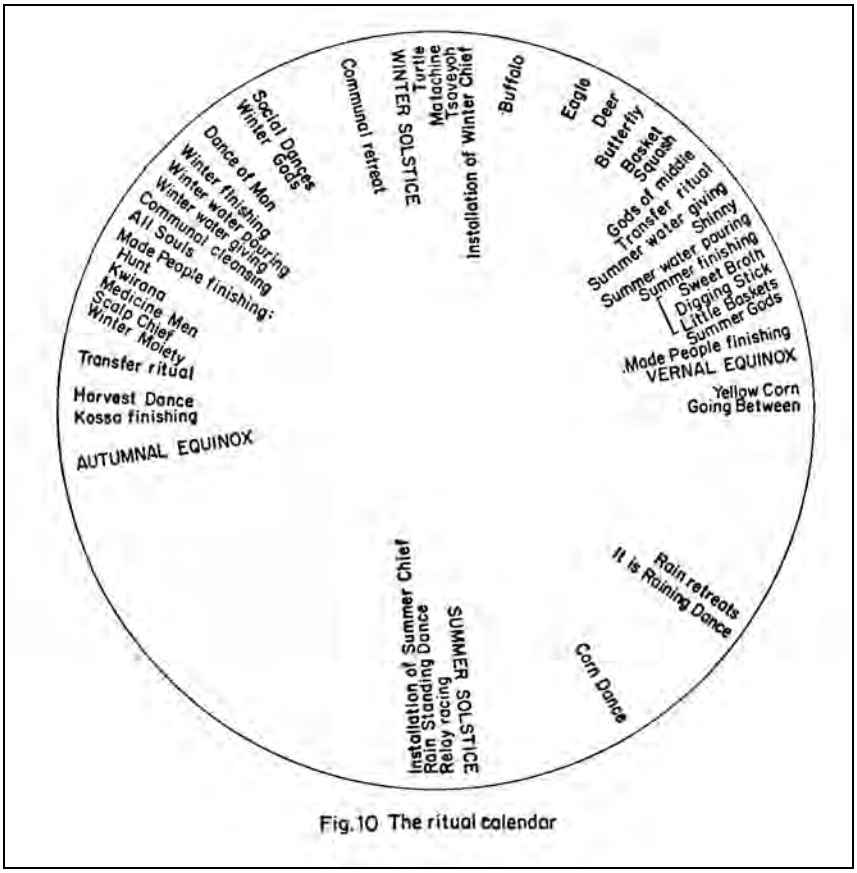

Figure 7.5 The Tewa ritual calendar, from Ortiz (1969, p. 104). © 1969 by The University of Chicago Press. All rights reserved. Reprinted with permission.

Fig. 11 The subsistence cycle

Figure 7.6 The Tewa subsistence cycle, from Ortiz (1969, p. 110). © 1969 by The University of Chicago Press. All rights reserved. Reprinted with permission.

The interweaving of story, song, dance, ritual and ceremony

As with all oral cultures, story, song and dance form a major part of the social life, enabling content to be recalled to memory constantly.

> We live in a culture of primary orality filled with metaphors. We passed the culture on and interpret it for children in the way we understand and perceive it, and this is best done verbally, orally, in the form of stories (Naranjo 2008, p. 257).

Titiev writes that storytelling is an integral part of the Hopi calendar (1972, p. 146) while the Hopi sing constantly (1972, p. 159). In fact, the possession of songs is considered more important than the possession of shrines and ritual paraphernalia (1972, p. 89).

As has been the case for all oral cultures discussed in this thesis, Pueblo ceremonies serve a multiplicity of purposes. Ceremonies are times when food redistribution takes place, ensuring that everyone has sufficient food and reducing the claims on any single individual or family (Harvey 1972, p. 210; Ortiz 1969, p. 113; Reyman 1980, p. 46). Titiev describes the Hopi attending ceremonies of other language groups for trade (1972, p. 109) and for socialising, visiting and feasting (1972, pp. 60-1). Bawdy and comic songs from various

festivals at other villages are repeated providing continued enjoyment and gossip (1972, p. 152). Social comment is a significant aspect of the gatherings. Ortiz describes the way the Tewa dances include clown burlesques which mock Catholic rituals such as mass, baptism and weddings, government officials, missionaries, tourists, modern devices such as the telephone, along with grotesque and exaggerated caricatures of other tribes such as the Apache, Navajo, Mojave, Commanche and Sioux. Ortiz writes that burlesque and caricature permit insights into what 'the pueblos find serious or absurd, baffling or wrong, fearful or comical about life and about other people'(1972, p. 147). Not surprisingly, Titiev makes comments throughout his diary of the high level of sexual activity at gatherings (for example, see 1972, p. 162).

Given the focus of this thesis, it is interesting to note that Ortiz writes that elaborate ceremonial recognition is given to natural phenomena while ceremonies surrounding birth, puberty, marriage, and death are fairly insignificant by comparison (1972, p. 141).

The importance of acoustics

As was indicated in Chapter Two, acoustic enhancement adds greatly to the mnemonic impact of performances. Reference is made in many resources to the use of drums and gourd rattles to accompany the dancing (see for example McCluskey 1977, p. 177). Drums and gourd rattles were used in the dances witnessed at the Indian Pueblo Cultural Center. They provided a strong rhythm more than a distinctive tune. Roberts (1972) analysed the ethnomusicology of the Eastern Pueblos, noting that ceremonial chants and songs are often restricted. Roberts concluded that the similarities found throughout the pueblos in musical styles, choreographic patterns, body movements and hand gestures indicate that the traditions are ancient and are the products of a long period of borrowing between villages.

As will be shown in Chapter Nine, I was able to show impressive acoustic enhancement in a prehistoric kiva room at Aztec Ruins. The enhancement of chants, drums and other musical sounds in the enclosed kivas of modern pueblos would also be significant.

Mnemonic technologies - permanent

Landscape as mnemonic

European tradition produces maps and pictorial images which are 'landscapes *of memory*. In contrast, many non-Europeans engage in landscapes *as memory*' (Ferguson 2002, p. 4.5). The close relationship of the Pueblo to the landscape, in particular the nearby mountains or bodies of water, is constantly acknowledged (for example, see Harvey 1972, p. 211; Ortiz 1972, p. 142; Tyler, 1979, pp. 9-12). Naranjo talks about stories which ground the

‘community in a landscape full of meaning’ (2008, p. 254). In hearing the stories which teach moral lessons, Naranjo points out that they also teach children to identify specific landscape locations and to understand the cultural landscape of the Tewa homelands. Ortiz also reports that, through oral tradition, many Tewa elders have a very detailed knowledge of ruins, lakes, ponds, springs, and other prominent topographic features in areas beyond their experience (1969, p. 148).

The layout of the Pueblo village reflects the sacred landscape sites in the four cardinal directions. The mountains and buttes in the distance are linked to shrines, consisting of stone structures near to the village, and dance plazas within it. All landscape features form groups of four, visited in ritual order, which Ortiz refers to as forming ‘a complex and meaningful system of classification’ (1969, p. 20).

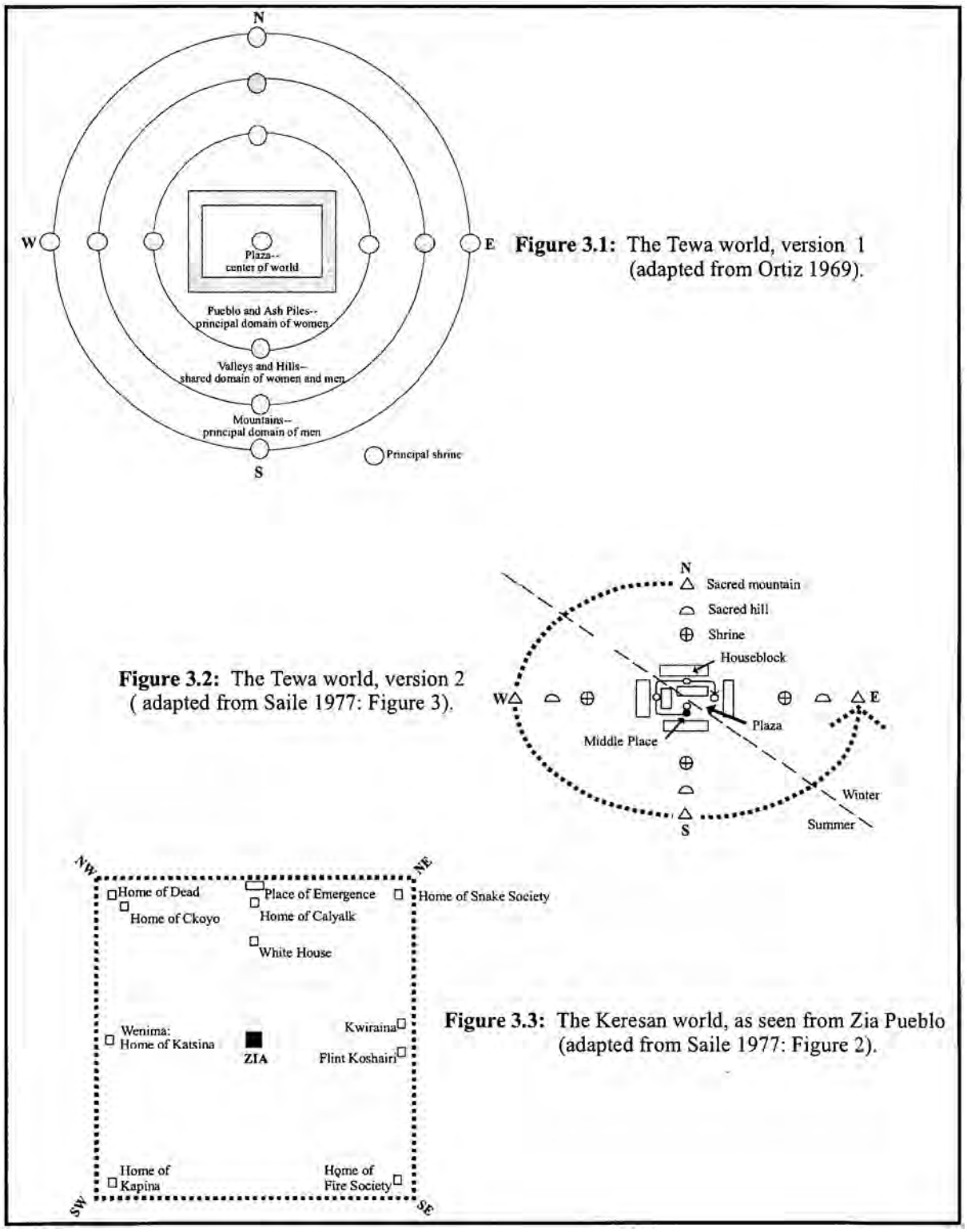

Figure 7.7 The Tewa and Keresan Worlds. From Anschuetz (2002, p. 3.4). Permission sought.

In describing the importance of pilgrimage to Pueblo people, Anschuetz (2002, p. 3.27-30) offers a description of rituals performed at landscape loci associated with retracing of ancestral journeys. These pilgrimages are entirely consistent with the powerful mnemonic technique, the Method of Loci, described in Chapter Three.

Ferguson (2002, p. 4.9) describes a pilgrimage trail of hundreds of miles which connects Zuni Pueblo with a location in the Bandelier National Monument, with stops at shrines along the ancient migration routes, the names of which are still recited by extant religious societies in their esoteric narratives. Contemporary pueblo pilgrimage pathways are often marked with shrines of stone cairns or circles (Van Dyke 2007, p. 58). Ron Shutiva, a religious leader from Acoma Pueblo, told me that pilgrimages are constantly made to the sacred mountains where community elders spend a great deal of time performing the chants (2009, pers. comm., 24 October).

Landscape mnemonic pathways are not only those physically travelled. Ortiz describes Tewa moiety chiefs who 'shout the emergence path' as they trace the origin journey from the distant lakes (1969, p. 40). He writes that 'the words and the method of delivery of all prayers and speeches are the same; only the places mentioned are different' (1969, p. 22). Made People invoke the authority of the mountains, while the *Towa é* name the mesas (1969, p. 23). [13]

Rock art, painted and engraved, representational and abstract, holds an important role in Pueblo cultural life, as has for over a thousand years, such as explored in terms of Zuni beliefs by Young (1991) and from the contemporary discussions with a range of language groups as recorded by Anschuetz, Ferguson et al. (2002).

> Certain images-generally among the more ambiguous in design and dating from the earliest time periods-stimulated the narration of excerpts of Zuni myths, and tales about creatures or events called to mind by these images (Young 1991, p.10).

Mnemonic technologies – portable

In Chapter Three, traditional art was presented as mnemonic to knowledge rather than as an aesthetic creative form. Tewa born, Dr Rina Swentzell, writes that 'there was not "art for art's sake" in the traditional pueblos because art was an extension and reinforcer of the social and religious life' (as quoted in Anschuetz 2002, p. 3.23). Designs on ceremonial objects are fairly stable, which Bunzel considers to be due to the fact that the primary motivation is not aesthetic (1972, p. 85). In a detailed analysis of Pueblo pottery, Bunzel notes that the paintings on sacred drums 'are of the same character as those on the walls of certain rooms in which these cults hold the esoteric ceremonies. They belong to the whole complex of religious paraphernalia: house paintings, sand-paintings, altar boards, masks, etc.' (1972, p.

[13] For a detailed analysis of the way Native American people link ordered landscape sequences to story and knowledge, see Basso (1996). Basso writes about the Apache, but the similarity in method to the Pueblo is noted by Anschuetz, Ferguson et al., (2002, p. 4.6).

84).

As has already been noted, masked dancers are a feature of Pueblo culture, the mask identifying the specific kachina, or other mythological being, and thus the associated stories. Members of the societies also have objects which represent their status, such as perfect ears of white corn representing the corn mothers, and various figurines, including bears, mountain lions and T*owa é* representations (Ortiz 1969, p. 89). Kachina representations are found on a variety of media, including pottery. Dolls representing kachina are given to children to start learning the characters. They are not dolls in the Western sense, but the first stage of a child's learning to recognize the kachinas and know their stories (Colton 1959, p. 5). The dry roots of dead cotton wood trees, feathers and other materials are used to make the dolls which are then painted with the essential features of the specific kachina (Colton 1959, p. 10) as shown in Figures 3.35 and 3.36.

Figure 7.8 Representational Ancestral Pueblo petroglyph from the National Petroglyph Monument, New Mexico. Photograph: Lynne Kelly.

Figure 7.9 Abstract Ancestral Pueblo petroglyph from the National Petroglyph Monument, New Mexico. Photograph: Lynne Kelly.

Figure 7.10 Drawings of Hopi kachina dolls. Source: Jesse Walter Fewkes (1894a) Dolls of the Tusayan Indians, Plate 11.

Mnemonic technologies - ephemeral

Sand or dry paintings are far better known among the neighbouring Navajo, but are also known from Pueblo people (Tanner 1945). As they are rarely mentioned compared to the other forms of mnemonic technologies, they will not be explored further at this time, although Ortiz describes dry painting as 'one of the most sacred acts performed' (Ortiz 1972, p. 143). Pueblo cultures practice also body decoration with black mud (Ortiz 1969, p. 93), but again this is rarely mentioned.

Plants and animals

Agriculture cannot be used to successfully feed a sedentary population in a harsh climate without careful control of the process, ensuring that optimum use is made of knowledge gained over many generations. Hopi ceremonial and agricultural cycles are closely related, with rituals dictating the time of planting seeds, such as bean and corn, which are raised initially in heated kivas (McCluskey 1977 p. 176; Titiev 1972, p. 186). Ortiz (169, pp. 111-5) describes the way Tewa hunting, gathering and the planting of crops are carefully managed by the Made People through ritual. Ortiz concludes that

> just as there is a complex but comprehensible dual organization in ritual, there is also a basically dual pattern of subsistence activities that ritual reflects, reinforces, and serves to perpetuate (1969, p. 116).

Too often, discussion of traditional beliefs are interpreted as non-scientific activities because of the constant reference, intentional or not, to the religions of literate cultures. This thesis argues that the analogy is not valid and the seeking of modern religious equivalents in the rituals of oral cultures may obscure the complex role of the rituals within the non-literate knowledge system. A discussion of the role of corn in Tewa rituals is a powerful example of this argument.[14]

Ortiz writes that 'each winter the medicine men of the village plant the seeds of all cultigens and those of plants utilised as food in the mother earth navel; this is how nature is reawakened each year' (1969, p. 21). This statement could be superficially read as a ritual calling on supernatural beliefs to cause nature to respond. There may be that aspect to it, but for the purpose of this thesis, it is worth noting that Ortiz recommends that readers also refer to botanist and anthropologist Richard I. Ford's work as complimentary to his own (1969, p.

[14] See Sekaquaptewa and Washburn (2009) for details of the Hopi equivalent, the ritual songs of the 'corn lifeway' and the link to corn agriculture.

xviii).

> In order to appreciate the meaning of corn from the Tewa point of view and the significance of their harvest from a western, scientific perspective, we must understand their interpretation of the physical world and the classification of corn according to their sacred colours – the key to Tewa survival (Ford 1980, p. 17).

Corn symbolism and metaphor permeates every aspect of Pueblo life. For example, in dances, it is common for a cob of corn to be held, as shown in Buffalo Dance in Figure 7.4 above. Ford describes the growing corn plant as a 'mnemonic reminder of Tewa cultural history' (1980, p. 19). After rising from the ground, as the people did in the emergence story, the stalk and roots point in the sacred directions. Stories about the corn maidens are a fundamental aspect of Tewa moral teaching. Pairs of corn maidens are represented by cobs of kernels in the sacred colours associated with each direction: blue for North, yellow for West, Red for South, White for East, Black for the zenith, and all-coloured for the nadir (1980, pp. 19-20). The directions also lead to an extensive system of association that connects colours, birds, flowers, animals, plants, corn and so on, to each of the 6 directions (McCluskey 1977, p. 178).

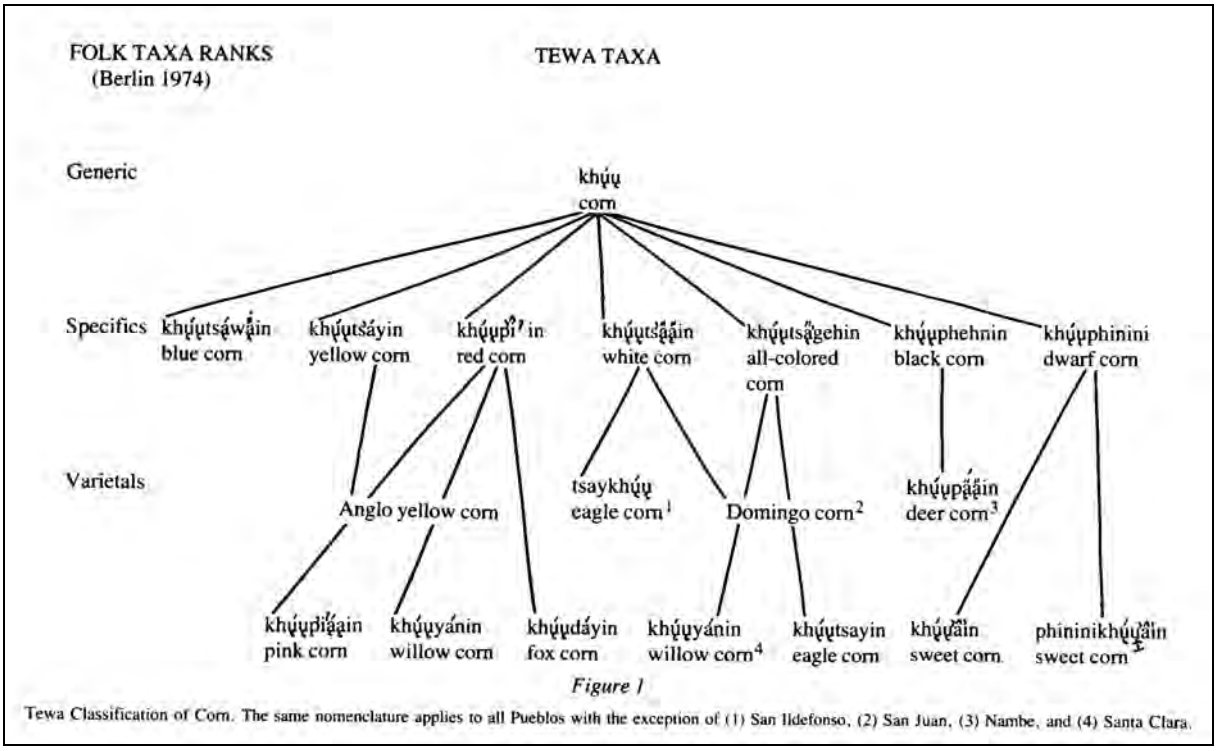

Figure 7.11 The corn varieties. Diagram from Ford (1972, p. 21). © Richard I. Ford. Reprinted with permission.

The first level of the Tewa classification of corn consists of six species designated by colour, and a seventh species, dwarf corn. In ritual, the corn names are always given in sequence, which serves to index the information. In the Tewa case, the sequence is blue corn, followed by yellow, red, white, all-coloured, black and finally dwarf corn (Ford 1980, p. 22). Ford argues that by using colour as the primary attribute in the taxonomy, the system is simple to adapt to new corn varieties in changing situations due to drought, agricultural technologies or new stock animal species (1980, p. 23). The second level of named corn types are linguistically and culturally secondary to the first level, and seen as related, but different, varieties. Ford notes that the Tewa system of classifying corn is prevalent throughout the Pueblo cultures (1980, p. 28).

Ortiz writes that the agricultural cycle is initiated by the transfer of authority to the Summer chief. Four days after he takes office, each family in the village takes a basket of seed grain to be blessed for planting (1969, p. 114). The rules for this blessing, the selection of seed of the various colours, and guides for planting, are all stored in the oral tradition encoded in the stories of the Corn Mothers and the Corn Maidens.

Ford (1980, pp. 23-7) describes the ritual process from a scientific perspective. He writes that the Summer chief, when blessing baskets of seed corn, 'will reject corn he regards as inappropriate for feeding the deities or ancestors…. the leaders will reject all substitutes at variance with the taxonomic order' (1980, p. 23). When the corn is husked, sorted, and stored, perfect ears are selected for ritual and seed stock. Non-perfect ears are stored, by colour, for daily use. Rarely are all primary corn types successful in a given year. Natural events limit the yield of the various colours, such as weather and the impact of domesticated animals, grasshoppers, birds, skunks, deer and nomadic raiders. Corn cross-pollinates very easily, so Pueblo farmers plant each colour in a separate field, with fields scattered and bordered with other crops as a buffer.

To explore the degree of cross-pollination, I managed to secure seeds of 'Anasazi corn', as the coloured cobs are called in Australia. Despite planting them a month after a yellow sweet corn crop, and five metres away, all cross-pollinated as in Figure 7.12.

Figure 7.12 Cobs resulting from planting 'Anasazi' coloured corn in an Australian garden near yellow sweet corn. Photograph: Lynne Kelly.

The inconvenience of having to tend multiple locations is balanced by the resulting availability of perfect cobs of a single colour (Ford 1980, pp. 26-7). Although the total yield will not be maximised, planting different colours reduces the high risk of total loss which could occur with a monoculture. Ford explicitly links ritual to survival when he writes that

> ritual imperatives and traditional cultural practices depend on corn types of pure colour. Adherence to the practice of growing sacred colour corn in the face of adversity means survival for the Tewa…. The outcomes resulting from adhering to ritual needs through the cognized environment, or maintaining named corn types in separate and dispersed fields in the operational environment, are the same – reliable corn production in a harsh climate (1980, pp. 27-8).

It is important to note that the use of plants is not limited to sources of food. Ethnobotanical studies indicate that Pueblo also have extensive knowledge of the wild plants, which are classified to give structure to their understanding (Harrington, Robbins et al. 1916).

Plants form the major component of the traditional pharmacopoeia and may be used as narcotics. The members of Pueblo medicine societies form one of the highest levels within the Pueblo hierarchy, going through years of training and experience to gain the restricted knowledge, often travelling to gather necessary plants (Ford 1976, p. 153; Ortiz 1969, p. 107; Titiev 1972, p. 57, 140). The songs sung and plants gathered by the Made People at distant

retreats are among the most closely guarded secrets (Ortiz 1969, p. 107). *Datura inoxia* (formerly *Datura meteloides*), for example, was used by Pueblo cultures primarily for its narcotic qualities, but also as a disinfectant, external medicine and, importantly, an anaesthetic, its properties recorded in myth (Yarnell 1965, pp. 667-8).

A large number of animals are recorded in Pueblo oral tradition. Migratory birds such as geese and cranes, are used as calendrical indicators and are prominent in myth and ritual (Ortiz 1969, pp. 171-2). Hunting and fishing are the principal subsistence activities during autumn and winter, with timing again dictated through ritual to ensure that sufficient breeding stock are left in the wild (Ortiz 1969, pp. 112-5).

Animal knowledge extends far beyond their role as a food source. For example, restricted knowledge about how to treat snake bite, the location of poison sacs and the way in which snake poison is injected and flows, is held by the Hopi Snake Society (Titiev 1972, p. 37, 183). Hamilton A. Tyler (1979) documented Pueblo bird knowledge and the associated myths. He was able to identify Pueblo names for over 220 species of birds. When chants are recited in Pueblo ceremony, meaning is conveyed purely by the mention of the bird's name. Henderson and Harrington (1914) wrote a Tewa ethnozoology, describing how the informants named and recorded behaviour of over 50 mammals, along with reptiles, amphibians, fish, spiders and their webs, molluscs and coral, although none of the last two categories are found locally. Naming over 50 bird species, the Tewa identified 17 species long extinct in the area and which could not have been learned through observation. The insect list included many unknown to science at that time. The nearby Navajo are known to have classified over 700 insects to three levels (Wyman & Bailey 1964, p. 11).

Animal references are pervasive. Clans, such as define Hopi social structure, are often named for animals (Titiev 1972, p. Page 34-5). Mythology and metaphor links animal behaviour to human experience (for example, see Titiev 1972, p. 113-4) and may be represented by kachina, such as the killdeer kachina discussed in Chapter Four.

Time and space

Pueblo cultures are less concerned with time associated with linear history than with the concept of cyclic time associated with the subsistence and ritual cycles (Ortiz 1972:143). A great deal has been written on the Pueblo 'sun-watchers', a detailed analysis of which, unfortunately, is beyond the scope of this thesis.[15] The movements of the sun are mapped against named points on the horizon (Fewkes 1895, pp. 8-9). Stellar observations serve as checks on the solar observations, especially during adverse weather conditions, with the rising

[15] For more detail on Pueblo astronomy see Carlson and Judge (1987); McCluskey (1977; 1993); Reyman (1980; 1987); Zeilik (1985; 2008).

and setting of Venus being used for the timing of ceremonies (Reyman 1980, p. 41; 1987, p.130). McCluskey (1977, pp. 176-7) describes a Hopi ritual recitation of 20 verses naming the rising or setting points of the sun on the horizon, and linking these to the agricultural cycle and the ceremonial cycle, including the kachina dances.

Reyman analyses the power of the sun-watchers, a power which he links to their control over esoteric knowledge and their ability to predict seasonal changes (1987, p. 130), 'their power increasing or diminishing with their ability to "control" these phenomena' (1980, p. 40). Pueblo astronomy is almost entirely pragmatic, maintaining the agricultural and ceremonial calendars (McCluskey 1977 pp. 190-2; Zeilik 1985, pp. S86-9). McCluskey concludes that

> For a society like the Hopi, subsisting in a marginal agricultural region, the maintenance of their calendar is absolutely essential to the survival of this society. The complexity and redundancy of the astronomical system can thus be seen as an integral part of their social adaptation to this harsh environment (1977, p. 192).

Conclusion

This chapter has taken the concepts introduced in the first five chapters of this thesis, and explored the way they are manifest within a group of closely related small-scale sedentary cultures, the Pueblo. The power associated with control of knowledge, the oral and material mnemonic technologies and the depth of pragmatic knowledge have all been shown to be critical to Pueblo culture and survival.

The studies that have informed Part One of this thesis indicate that, for small-scale mobile and sedentary oral cultures, the role of knowledge is of paramount importance in terms of power and the expenditure in energy for the ceremonial cycle. The role of primary orality and knowledge is underrepresented in archaeological interpretation of ceremonial sites. Part Two willo address this issue.

The last comment in this chapter is left to Tito Naranjo, expressing his fear of a knowledge system being lost.

> As elders die, ceremony and ritual die simultaneously; the matrix of what primary orality created for the culture through Being cannot be restored (Varien, Naranjo et al. 1999, p. 403).

PART TWO

Chapter 8 – primary orality in the archaeological context

Introduction

American sociologist, Carl Couch titled his 1989 paper with a critical question which deserves far more attention than it has, to date, received. He asked: 'Oral technologies: a cornerstone of ancient civilizations?' (1989). Couch went on to write that '[i]f only a limited amount of information is available, a highly differentiated society cannot emerge nor be sustained' (1989, p. 588). Couch argues 'that all preliterate ancient societies with a complex social structure made extensive use of orality to preserve information' (Couch 1996, p. 29). Part Two of this thesis uses the cross-cultural generalisations from Part One to show that not only are Couch's arguments of the essence, but that the fundamental role of oral technologies can be detected in the archaeological record. British archaeologist, Colin Renfrew writes that we 'need to understand more adequately the mechanisms of learning, and the way we humans manage to store what we have learnt' (2007, p. 107). It is hoped that the analysis offered here, and the introductory case studies in the next three chapters, may be of value to archaeologists in the goal Renfrew sets.

What is universal in oral cultures is the imperative to store knowledge in memory. Without this knowledge, the culture simply would not survive. It is not the content of the oral tradition that may be detected in the archaeological record, but the material mnemonic devices and knowledge sites which aid memory. Tewa born sociologist, Tessie Naranjo, questions how archaeologists would deal with an important person in oral tradition when the only material clues are items such as feathers, rattles, turtle shells, drums and kivas. An archaeologist would need 'to listen carefully to our stories and our songs in order to find him' (Naranjo 2008, p. 260). Without the stories and songs, the meaning behind many enigmatic aspects of the archaeological record can never be known. However, the fundamental role of the information system can be detected.

This chapter will present a set of ten indicators for identifying memory theatres and the presence of a knowledge elite through material remains. A full analysis is clearly beyond the scope of this thesis, in fact, beyond the possibility of any single work. However, this chapter will offer a new interpretation tool with which to start. Although the ideas presented here are closely related to the field of cognitive archaeology, reference to formal knowledge systems and mnemonics has not been found in that literature[16]. Further analysis of this field is

[16] An excellent overview of cognitive archaeology is found in Flannery and Marcus (1996)

beyond the scope of this thesis. It is also beyond the scope to analyse theories about the role of information processing in the evolution of societies (see for example Flannery 1972; Sebastian 1992, pp. 65-68), although this study could clearly add a new perspective to that debate.

Three very different contexts will be explored in terms of the ten indicators: Chaco Canyon in the Chacoan context, Poverty Point in the Mississippian mound-building context, and Stonehenge in the British and Irish Neolithic context. Part Two of this thesis is thus seen as a starting point for a great deal of further research and debate.

Knowledge and power in prehistoric cultures

Levi Strauss, in his seminal work, the title of which is usually translated as *The Savage Mind* (1966), asks that ethnographers reconsider the representation of the low intellectual level of 'primitives', writing that scientific thought is 'extremely widespread in so-called primitive societies. We must therefore alter our traditional picture of this primitiveness' (1966, p. 41). Havelock extrapolates into the prehistoric realm, arguing for a recognition that prehistoric cultures should be interpreted not as primitive cultures but through their orality when he writes:

> It is accepted that prehistoric human societies formed on the basis of intercommunication through language, whether the members were hunter-gatherers, farmers, or something in between ….What Lévi-Strauss was investigating was not La pensée sauvage, but La pensée oraliste (Havelock 1991, pp. 20-1).

The goal of this chapter is to consider pre-state archaeological sites through the lens of their orality. 'It is difficult or impossible for individuals from a background of literacy to understand people who derived from primary orality' (Varien, Naranjo et al. 1999, p. 404). It is essential that we try, because any reconstruction of their culture, without consideration of their orality, must surely be deficient.

Oral specialists are granted a great deal of power in oral cultures because there is a generally accepted belief that knowledge is beneficial to all (Couch 1990, p. 166). It is reasonable to assume that a knowledge elite existed in powerful roles in non-literate cultures in the past, acknowledging that there is a wealth of variation in the roles and the nature of the knowledge they kept. The question then needs to be asked: how could these formal oral structures, and a sociopolitical structure based on the control of knowledge, be identified in a

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along with Renfrew and Bahn (2008, pp. 391-428).

purely material archaeological record?

Knowledge systems in transition

It is proposed here that if hunter-gatherer bands accumulate into larger populations and start to reside more permanently in a given location, they would still have the same requirement for ordered mnemonic structures as were once embedded in the landscape they travelled. Power in those early settled cultures, it is argued here, was still in the hands of those who controlled the esoteric knowledge, much of which was pragmatic information on which their survival depended. It is proposed here that the mnemonic needs of a hunter-gatherer knowledge elite continued into early settlement, dictating the physical structure of Neolithic and Archaic ceremonial complexes during that transitional phase.

Although an analysis of the debate about the evolution of societies is beyond the scope of this thesis (see for example Service 1960; Pauketat 2007; Yoffee 2005), the need to consider the development of symbolism in the transition to agriculture is made by Davidson (2010b). The assumption here is that as a mobile hunter-gatherer culture develops into a sedentary agricultural society, there is an imperative to retain knowledge stored in the songs, ceremonies and rituals as well as incorporate new knowledge related to agriculture and the legal requirements of a larger community living in close proximity. As agriculture becomes more dominant, and the dependence on wild resources reduces, so the knowledge system adjusts.

> The first farmers were heirs to that knowledge, accumulated through tens of thousands of years of nature observation by biologically modern humans living in intimate dependence on the natural world (Diamond 1998, p. 144).

Based on theories of human information processing, it is reasonable to associate greater ritual specialization with larger aggregations (Adler & Wilshusen 1990, p. 136). As the integrated knowledge system becomes segmented into specialisations such as law, medicine, genealogies, navigation, farming and so on, reliance on a generalised knowledge elite controlling an integrated knowledge system will dissipate. The power of this elite, and the justification of enormous labour input into constructing the monuments, would gradually disappear. Consequently, I will argue that such monumental sites as the mound-building sites of the southeastern American Archaic and the stone and timber circles of the British and Irish Neolithic, described in Chapters Ten and Eleven, served a purpose only during the transition from hunter-gatherer to large-scale sedentary agricultural societies. Larger settlements, such as the Chacoan culture, described in Chapter Nine, required knowledge centres in which a

knowledge elite could train the knowledge keepers of the smaller outlier communities. However, this analysis in no way implies that all hunter-gatherer cultures are on a linear pathway towards statehood, nor that for any culture, the transition from hunter-gatherer to agriculture was a simple linear progression.

I do not believe that there is any culture within the historic timeframe which matches the transitional stage described above. Consequently there are no direct ethnographic analogies, only cross-cultural generalisations and inference.

Clarifying some frequently used terms

The troublesome term 'ritual'

There is a 'simplistic tendency of explaining any prehistoric artefacts, constructions, or cultural expressions whose purpose is unknown and hence mysterious, as necessarily having a ritualistic or religious function' (Turnbull 2002, p. 130). Insoll describes 'ritual' as 'the archaeologists' favourite catch-all for 'odd' or otherwise not understood behaviour' (2004, p. 1). Acts and beliefs have 'somewhat indiscriminately been described as ritual, ceremonial or religious phenomena' when dealing with non-literate societies (Goody 1961, p. 143). Fleming (1973, p. 178) argues that many pre-historians fall into the trap of saying if it is to do with ritual, then it is connected with both unknowable and irrational ideas which cannot therefore be understood.

There is every reason to assume that prehistoric cultures used ritual for pragmatic purposes, such as Rappaport discussed in his seminal writings about the New Guinean Tsembaga,

> It has been argued that the regulatory function of ritual among the Tsembaga and other Maring helps to maintain an undegraded environment, limits fighting to frequencies that do not endanger the existence of the regional population, adjusts man-land ratios, facilitates trade, distributes local surpluses of peak in the form of pork throughout the regional population, and assures people of high-quality protein when they most need it (1967, p. 224).

It is the pragmatic aspects of ritual which will be addressed in this thesis, with the religious aspects understood to be part of an integrated system.

A confusion of ancestors

The problematical use of the term 'ancestors' in interpreting the archaeological

record has been widely discussed[17]. The issue arises when writers are not clear whether the ancestors being invoked are mythological beings or forebears. Rarotongan peoples will give their genealogy in two parts: their descent from a founding ancestor in the mythic past, and as a record of births, deaths and marriages which establishes status and rights (Campbell 2000). This is very like the Australian Aboriginal concepts of totemic ties to their Dreamtime ancestors held concurrently with their complex family ties (Rose 1992). Similar ancestral complexity can be found in Native American cultures (Sobel & Bettles 2000). Finnegan writes that the expression 'we learnt this from the ancestors' is not necessarily to be taken literally, but as a way of raising the song or narrative above the ordinary level of communication (1988 p. 66).

Care will be taken in this thesis to clarify whether the ancestors are mythological or forebears, or some combination.

A note about shamans

'Shamanism' is a controversial term usually referring to some form of contact with the spirits using an ecstatic state which may be brought on by a wide variety of methods from alcohol, rapid over breathing, dancing, rapid breathing, or the inhalation of drugs, fasting and through the release of natural opiates (Bradley 2000, pp. 30-32). Among hunter-gatherers, such as Australian cultures and the !Kung of the Kalahari, trance-like states are achieved through drumming, singing, dance and physical exhaustion, without the use of hallucinogenic substances (Flood 2006, p. 145; Marshall 2009). For the LoDaaga, revelation is associated with sleep, with trance possession playing little or no part (Goody 1987, p. 153).

Reference is made to American Hopi using Datura for medicinal and hallucinogenic purposes (Ford 1978a, p. 30) but in the great deal of material read about the Pueblo cultures, trance-like states and the use of hallucinogens was barely mentioned. The emphasis on the exotic by some ethnographers should not influence archaeological interpretation to favour shamanic explanations at the expense of the pragmatic and didactic purposes of ritual. The concept of rock art being produced through trance-like states in shamanistic practices is widely disseminated (see for example Lewis-Williams 2001, Lewis-Williams & Pearce 2005) and debated (see for example Helvenston et al. 2003). I do not find the arguments presented convincing enough for shamanistic practices to be assumed in prehistory. I find the rebuttals by Noble and Davidson (1993, pp. 126-9) much more convincing and for this reason shamanism is not an assumed practice for the purpose of this thesis. Critically, Ross and Davidson write that they 'know of no ethnographic literature that describes the production of

[17] for example, see Barrett & Fewster 1998; Steadman, Palmer and Tilley 1996, p. 64; Whittle 1998; Whitley 2002; Pitts 2003.

art during ritual, nor evidence that ties art produced after altered states of consciousness to the images witnessed during trance' (2006, p. 308).

I find it disturbing that researchers are so willing to ascribe the purpose of enigmatic objects, paintings and monuments to almost anything, no matter how speculative, other than intellect.

From social memory to formal knowledge systems

Fentress and Wickham (1992) discuss many aspects of social memory from a wide range of cultures, but the emphasis is always on memory of past events. From this perception of social memory, Mason (2000) argues that there is little value in oral tradition for archaeology, considering only the value in recall of historical events. He does not consider the value to archaeological interpretation of understanding the fundamental role of oral tradition in non-literate cultures, a misconception it is hoped this thesis will correct. There is also a misconception that cultures without writing do not have highly developed memory practices (see for example, Olick & Robbins 1998, p. 115) which, it is hoped, Part One of this thesis has dispelled. In fact, d'Errico argues that artificial memory systems were developed and used in Europe at least from the beginning of the Upper Palaeolithic, perhaps earlier in other parts of the world (1998, p. 43) with individuals specialising in storing memory (1998, p. 47).

Van Dyke and Alcock's book, *Archaeologies of memory* (2003), drew studies of social memory firmly into the archaeological context. The book had a significant impact on this thesis, in particular indicating the role of memory in two of the sites chosen for further exploration, Poverty Point (Pauketat & Alt 2003) and Chaco Canyon (Van Dyke 2003). The emphasis in the book is primarily related to recalling past events, of oral tradition as history, but makes the move toward a broader context. It is from Van Dyke and Alcock's seminal book that this chapter will take the next step and look at ten indicators for the role of formal knowledge systems and control of knowledge for theorising the socio-political structures of cultures known only through archaeology.

The ten indicators of knowledge as power

1. A stratified society with no sign of individual wealth or coercion

> The use of oral technologies led to specialists who were focal persons of their communities. These knowledge specialists maintained their elite position by command of information, not through the use of coercive powers (Couch 1989, p. 597).

As was seen in Chapter One of this thesis, in small-scale societies such as the Australian Aboriginal and Pueblo cultures, those who control knowledge are not normally differentiated from the rest of the community in terms of material wealth. Nor is there need of coercion as power 'is afforded to oral specialists because there is a generally accepted belief that knowledge is beneficial to all' (Couch 1990, p. 166).

2. Large investment of labour for no obvious reason

Akinnaso (1992, p. 81) argues that institutionalised education is highly valued by oral cultures and hence they are willing to invest a great deal of labour and resources to this end. There is no reason to believe that oral cultures in prehistoric times were any different.

Monumental sites built, maintained and altered for growing populations on the cusp of settlement, or in the early stages of farming, are seen here as addressing the requirement to localise knowledge space when they are no longer visiting the dispersed landscape sites used as mnemonic by mobile cultures. Laws for maintaining social structures in a larger population, plus knowledge of domesticates, would become increasingly important. Knowledge of wild plant and animal species, genealogies, navigation and means to maintain a calendar would still be required. Hence, it is reasonable to assume that the building of monuments, which fulfil the requirements of a knowledge space, would be an imperative.

3. Public and restricted ceremonial sites

'The establishment of ceremonial centres was the watershed to the emergence of civilisations' (Couch 1996, p. 10). If ceremonial centres are to be considered as knowledge spaces, and monumental structures as memory theatres, then there should be evidence of the dichotomy found in most, if not all, oral cultures—that of public and restricted knowledge. Small as well as large sites need to be available within a given culture, for public and restricted performance. Sites may also indicate differing use over an annual cycle.

The imperative to perform the knowledge repetitively should leave an archaeological record in the prominence of a combination of public and restricted performance spaces. Platforms, mounds, enclosed spaces, plazas and even flat-bottomed ditches, can act as suitable performance spaces. It is important that archaeological interpretation sees beyond the naïve description of the performance of songs and dances simply as 'these entertainments' (Lévi-Strauss 1992, p. 282).

4. Monuments that reference the landscape

'People mapped, marked and presumably mythologised every landscape they encountered' (Tacon 2002, p. 223). As has been shown in Chapter Three, and clearly

demonstrated in the studies of the Yolngu and Pueblo cultures, landscape references are critical as memory markers in the oral tradition of both mobile and sedentary cultures. As Richard Bradley (1998, pp. 33-4) points out, a Mesolithic belief system based in the natural places has no need for monuments. Invoking the image of Australian Aboriginal songlines, Renfrew and Bahn talk about 'constructed landscapes, with meaning as well as utility' (2008, p. 403) arguing that

> societies which appear to have had a corporate structure rather than a powerful central leader, were capable of major public works—the temples of Malta and the megalithic centers of Carnac and of Orkney are good examples, as well as Stonehenge and Chaco Canyon (2008, p. 403).

Many writers refer to the way archaeological sites all over the world reference the landscape[18]. As Tilley writes, the building of the monuments prevented the significance of particular landscape places being lost and forgotten (1994, pp. 204-6)[19].

5. Signs of a prescribed order—the Method of Loci

If a monument is to serve as a knowledge space, then it is essential that there is some way of structuring the knowledge. There needs to be a prescribed order to the loci so that information is not lost through lack of reference. As described in Chapter Three, the ancient Greeks left record of the optimum artificial memory site. The set of locations must be in a definite sequence, should be in a location away from distracting passers-by, well lit, and not too much like one another, of moderate size, with a moderate distance between them (Yates 1966, pp. 4-9). The argument here is that memory theatres, such as Yates describes from the Ancient Greece into the European Middle Ages, greatly predate pre-literate Greece.

Circles or lines of stones or posts, ditches or mounds enclosing open space, or large, non-domestic 'buildings' would serve as memory theatres beautifully. Stones may reference mythical ancestors, and hence their stories, while posts can be painted or carved, as described in Chapter Three, each post acting as mnemonic to a particular mythological or historical story. A circle would be the natural arrangement to represent the annual cycle of rituals. Alignments with solstices would further strengthen the case. As will be shown in Chapter Eleven, a combination of smaller stone circles and larger knowledge centres, such as those known from Neolithic Britain and Ireland, for example, would serve particularly well.

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[18] for example, see Alves 2002; Bradley 2000; Calado 2002, p. 23; Niles 1999, p. 51; Ruggles 1999, p. 122; Tilley 1994.

[19] see also Bergh 2002, pp. 139-40; Bradley 2000; Cummings & Pannett 2005, p. 15; Tilley & Bennett 2001, p. 360.

Circles of stones are a natural form to act as memory aids to the ritual cycle as they provide a sequenced set of mnemonic loci representing, in open space, good light and individually identifiable, just as recommended by the Ancient Greeks for a set of memory loci (Yates 1966, pp. 4-9). Consequently, it is not surprising to find stone circles in the unrelated hunter-gatherer site of Gobekli Tepe, Turkey, adorned with engravings of animals (Curry 2008).

Circles of posts, as found in British Neolithic sites, are also found in Native American mound building sites such as at Poverty Point (Dr Diana Greenlee 2009, pers. comm., [email] 8 September) and Cahokia. The archaeologists at Cahokia even nicknamed their massive timber circle 'Woodhenge' after a similar circle about three kilometres from Stonehenge (Pauketat 2004, p. 75). De Jong (1998) concluded that timber circles in the Netherlands served both ritual and calendric functions.

6. Acoustic enhancement

Given the value of acoustics as a mnemonic aid, structures which enhance the acoustic effects would indicate that the role of knowledge should be considered in any analysis of that structure. The presence of musical instruments would also indicate a ceremonial role.

The use of ceremonial centres must be analysed in terms of the limitations imposed by the range of the human voice (Couch 1996, p. 26). Should the performance space be large, then it is likely that only a portion was used, or that it was only used for group performances. Small spaces are needed for restricted events, such as the kiva of the Ancestral Puebloan sites, and the chambered monuments of the British and Irish Neolithic. It is thus not surprising to find that studies point to the role of resonance and sound in choosing the location of paleolithic rock art (Scarre 1989, p. 382; Devereux & Jahn 1996; Waller 2006, p. 31) and in the construction of Neolithic monuments (Watson & Keating 1999).

7. Astronomical observations and calendrical devices

The individual, or group, who maintains the calendar holds a very powerful role in oral cultures, as discussed in Chapter Five. There is broad agreement among archaeologists that prehistoric peoples were observing the heavens, and noting the patterns of movement of the sun and moon, and, in some cases, stars (Ruggles & Barclay 2000; Renfrew and Bahn 2008, p. 405). Hayden and Vileneuvre take this analysis far further back in time than that assumed for the analysis in this thesis.

A survey of the literature shows that detailed solstice observances were common among complex hunter-gatherers, often associated with the keeping of calendars and the

> scheduling of major ceremonies. Moreover, aggrandizers in complex hunter-gatherer societies often form 'secret societies' in which esoteric astronomical knowledge is developed. The existence of calendrical notations and secluded meeting places for secret-society members are suggested to be at least plausible interpretations for a number of Upper Palaeolithic caves and images (2011, p. 331).

As discussed in Chapter Five, ethnographic evidence strongly suggests that astronomy was observed for its value in maintaining a calendar or aiding navigation. McCluskey considered the maintenance of the calendar as the primary goal of astronomical observations in Native American cultures with the knowledge 'embodied in myths and rituals' (1977, p. 174). He argues that the use of horizon observations is best adapted to a sedentary society, while mobile cultures would tend to use an astronomical system that is valid over an extended geographical area, such as heliacal risings of the stars. Haynes supports this contention:

> As hunter-gatherers, dependent for their survival on a foreknowledge of environmental changes, the Aboriginal Australians noted, in particular, the correlation between the movements and patterns of stars and changes in the weather or other events related to the seasonal supply of food (2000, p. 64).

Archaeologist W. James Judge writes:

> I feel that the field of archaeoastronomy has more ultimate relevance to archaeology than to astronomy, and that should make its home in the camp of the former. Though prehistoric astronomy may be of interest relative to the history of astronomy, I doubt that the key to the origin of the universe will ultimately be found in Pueblo Bonito. Archaeology, on the other hand, can benefit considerably from an understanding of the role of astronomy in prehistoric cultures (1987, p. 1).

As two sticks, or one stick and a horizon, will give the necessary measurements to track solstice alignments, why expend the energy required to built monuments as observatories? The argument here is that the role of observing the heavens was just one aspect of the purpose of the monuments as knowledge spaces.

8. Rock art as mnemonic

As discussed in Chapter 3, 'art' within oral cultures needs to be considered in contexts other than the aesthetic. The same argument has been made for the archaeological exploration

of prehistoric art (see for example Davidson 2010b; Bradley 2009). For the sake of this discussion, the definition of art will be that proposed by Davidson: art 'is the making and marking of surfaces' (2010b, p. 3). Rock art depictions of animals 'would be recognised as such by most members of the group, but they also could be used in a variety of ways to teach, explain, illustrate, or pass on aspects of traditional belief and practice' (Tacon 2002, p. 130).

John Pfeiffer, in his book *The Creative Explosion*, suggests that prehistoric cave painting acted as mnemonic to critical information, while the caves themselves served as the first memory theatres (1982, pp. 222-3). Australian rock art specialist, Paul Tacon argues that rock art, large monoliths, stone arrangements and mounds were marks used, among other aspects, to assist remembering the knowledge which must be passed on 'to teach practical aspects of hunting and food distribution, as a map of the nearby landscape, to impart 'Dreamtime' stories and for more restricted purposes' (1994, p. 124). Some rock art can be specifically linked to contemporary oral tradition. Bunjil, the traditional creator for Aboriginal cultures in south-eastern Australia, 'made the mountains and rivers, the animals and insects, and laid down the Laws for man' (Isaacs 1980, p. 57). Local custodian, Levi Lovett wrote of Bunjil's Shelter, Gariwerd (The Grampians), Victoria:

> Bunjil created our land, our people, the plants and animals, our religion and the laws by which we live. He is the leading figure in our spiritual life, essential in teaching our young people the importance of our laws and beliefs (Parks Victoria 2009).

Figure 8.1. Bunjil's Shelter, depicting Bunjil, the traditional creator of the land, and his two dingoes. Gariwerd, Victoria. Photograph: Lynne Kelly.

As shown in Chapter Three, rock art is often used to aid memory of the stories, songs, chants and other aspects of the knowledge system and intellectual life in Australian (Morphy 1991; 1998; Tacon 1994; Morwood 2002; Hiscock 2008), contemporary Western Iberian (Alves 2002, p. 53) and Native American and Canadian Shield (Rajnovich 1994) contexts. The possible didactic role of European rock art is highlighted by Helskog (2004, pp. 276-9) and Casey (1995), who describe rock art panels in northern Europe which they argue demonstrate seasonal aggregations or variations in the animals, such as coat condition and horns. It is not only large mammals represented in rock art. The ethnographic records suggest that insects were almost certainly exploited in antiquity (Sutton 1995, p. 255) so it is not surprising to find actions such as honey gathering techniques depicted in rock art (Dams & Dams 1977, p. 228-230; Crane 2005).

Because of its permanent nature, rock art remains when other art forms disappear due to the ravages of time. Rock art, therefore, plays a more significant role in the archaeological record than other forms, which may play an equally, if not more significant role, in contemporaneous traditional life. The permanence of the images does not dictate an unchanging knowledge system.

> [I]n societies dependent on oral transmission of knowledge, the production of permanent marks on the environment may allow those marks to be used as mnemonics, but it does not prevent change in the knowledge associated with them. The performance of the ritual may provide the legitimation of the information imparted through the marks, but it does not guarantee the faithful transmission of information from one episode to another. This flexibility is part of the distinctive adaptation of modern humans (Davidson 2010b, p. 7).

Despite the changes in culture and symbolic representation over millennia, Rosenfeld writes that in the rock art of Central Australia, ‘there are no identifiable stylistic breaks’ (2002, p. 61). Warning against assuming a continuity of narrative and meaning (2002, p. 73) she notes that there is ‘a continuity of essential motif vocabulary that testifies to an enduring graphic tradition’ (2002, p. 76). This thesis makes the assumption that rock-art often served a mnemonic role in the distant past. Unfortunately, as Davidson wrote when reviewing Morphy’s (1991) *Ancestral connections: art and an Aboriginal system of knowledge*, ‘[n]o archaeologist can ever hope to work through such a system of knowledge to capture even a fraction of the meanings of prehistoric paintings’ (1995, p. 892).

9. Enigmatic decorated objects

Designs on portable objects may be purely representational, but the relationship to stories, and thus to encoded information, needs to be considered when assessing their purpose. Just as etchings on the back of the Australian coolamon and the beads of the African lukasa, described in Chapter Three, act as mnemonic to knowledge, representational or non-symmetrical designs on utilitarian objects may also have a mnemonic role. Root suggests that portable information items are rare, elaborately designed, morphologically or stylistically distinct, have high visibility and are often curated, so as to keep information in circulation. They are not expected in burials nor caches, because both take information out of circulation (1983, p. 210).

A salient lesson can be learned from the analysis of a bowl from the Mimbres people of the American southwest, dated to about 1050-1150 AD. Kenward (2008) writes that the decorated Mimbres bowls have always been assumed to be stylised, but it is now recognised that a bat image included species-specific details for the Townsend long-eared bat – a species found in caverns now known to have been used for ceremonies. When examining Mimbres bowls in the Peabody Museum of Archaeology and Ethnology, I found that many appeared to represent stories, such as the one shown in Figure 8.2.

Figure 8.2 Mimbres bowl, Peabody Museum of Archaeology and Ethnology, Harvard Photograph: Lynne Kelly.

Along with the skewed distribution and the deliberate destruction of Mimbres bowls (LeBlanc 2005), it can be suggested that they from a part of the depiction of the oral tradition. In discussing the pottery designs from the Mesa Verde region of the American Southwest, Ortman makes the important point that images cannot be taken purely as simple representations. 'Ethnographic studies and psychological experiments indicate the conceptual metaphors are expressed in numerous forms in human expression, including speech, ritual, narrative, and material culture' (2000, p. 613).

Enigmatic inscribed objects, and their associated archaeological context, should be explored for their possible mnemonic role. For example, Neolithic engraved slate plaques from the Iberian peninsula (Lillios 2003; 2008; Jones, 2007, pp. 168-73) have been considered as mnemonic devices. Lillios concluded that

> there is compelling evidence to suggest that the plaques may, in fact, have functioned as mnemonics of lineage histories. In this light, the terms on which they are housed may also be viewed as memory archives or sites of memory storage (2008, p. 234).

The engraved slate plaques were also reused and repaired which Lillios noted resembled the results of analysis of Grooved Ware pots (2008, p. 239) which had four times the incidence of repair of other ceramics of the time, and formal deposition records in henge sites (Cleal 1988). Grooved Ware will be discussed in more detail in Chapter Eleven.

The use of figurines as both dolls and representatives of mythological characters from oral tradition is not only found among the Pueblo, as described in Chapter Seven, but also in other cultures such as the Brazilian Caduveo (Lévi-Strauss 1992, p. 175). It is important to avoid the simplistic conclusion that any female figurine is a 'fertility goddess'. For example, the figurine in Figure 8.2 could easily be interpreted in terms of fertility, but represents a Pueblo storyteller.

Figure 8.3 Pueblo storyteller figure, Cochiti Pueblo, ca. 1969. National Museum of the American Indian, Washington. Photograph: Lynne Kelly.

From the discussion and examples given in Chapter Three, it is clear that dance costumes, masks, props, notched or decorated wooden sticks or boards, inscribed bark, inscribed stones and hides, and representations of mythological ancestors on a wide variety of media should all be considered, depending on context, as possible mnemonics for the knowledge system.

Mnemonics to oral traditional may be ephemeral, evidence of which would be unlikely to remain in the archaeological record, however, such designs may well appear in other media. A valuable insight can be found in considering the Navajo sand painting of the Earth (O'Bryan 1993, p. 22), as the interpretation given from oral tradition could never be ascertained from the image alone. The various aspects of the design act as a structured index to a vast array of stories.

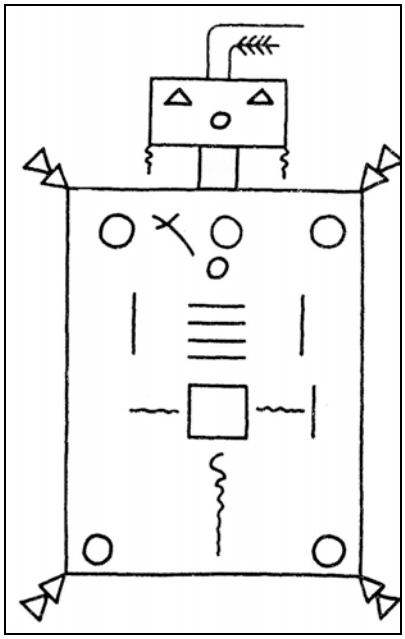

Figure 8.4 Navaho sand painting of the Earth. Adapted from: Aileen O'Bryan, Navaho Indian Myths, Dover Publications, 1993 [1956], p. 22.

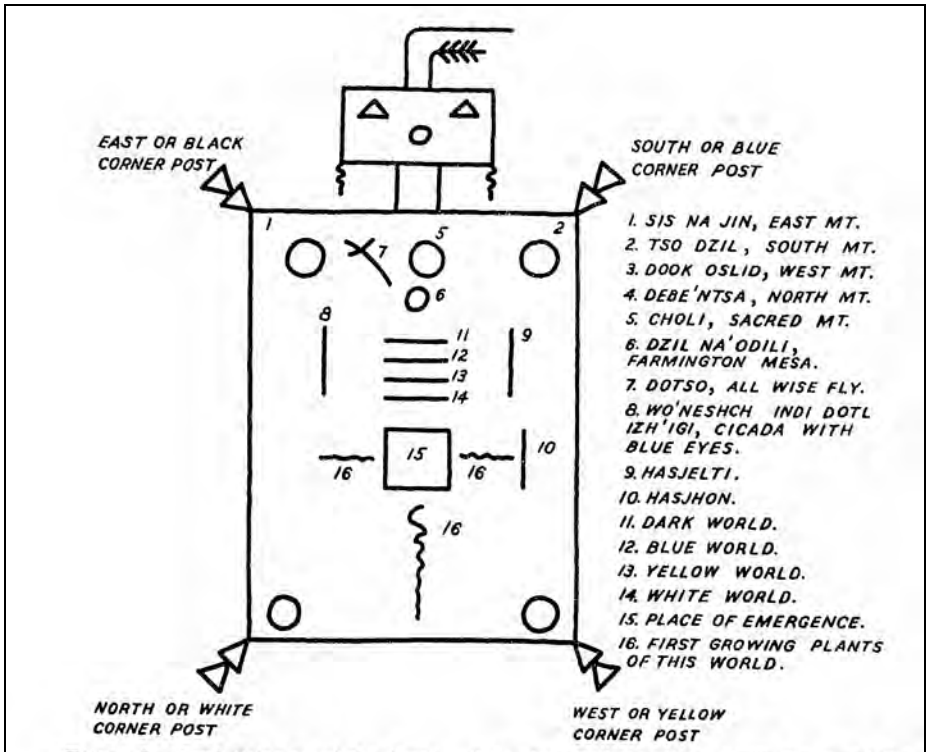

FIGURE 3.—Sand Painting of the Earth. (The plan of the earth.) From the top of the mask projects a breath feather, tied with a white cotton string, the spider's gift. Coral and turquoise ear pendants are indicated. The body is dark gray. Borders, mask, neck, etc. The two arms and two legs are kos ischin, triangles set upon one another and symbolizing forming clouds or cloud terraces. (Sam Ahkeak and Gerald Nailor got this from medicine men at Shiprock.)

Figure 8.5 Navaho sand painting of the Earth, annotated. Source: Aileen O'Bryan, Navaho Indian Myths, Dover Publications, 1993 [1956], p. 22.

Sets of items are difficult to assess, but it is critical to remain alert to this category. The items described in Chapter Three also included collections of curated human and animal bones and bundles of non-utilitarian or symbolic objects. A collection of shells or nuts, such as used by the Yoruba (Bascom 1980; McClelland 1982), could be assessed simply as divination tools, when further examination showed that they were, in fact, a method by which various aspects of the knowledge system could be referenced. By creating a hierarchy to the items, an index to the system could be invoked. It is just such an analysis which will lead to a radical new interpretation of Poverty Point Objects in Chapter Ten.

Knotted or beaded objects often appear as personal adornments. However, should the object not suit that purpose due to topology, or should the design be non-symmetric and non-repetitive, then a mnemonic purpose needs to be considered. As described in Chapter Three, Inca khipus / quipus were long believed to be tally devices, but recent research (Brokaw 2010, pp. 2-21) has shown that they also encode a much broader range of information. Similarly, wampum strings, belts and the Luba strings of beads all act as mnemonic devices. It is unlikely, however, that such items will remain in the archaeological record in a form which would indicate their mnemonic properties.

10. An imbalance in trade

It is also important to acknowledge knowledge as a commodity which can be traded. A ceremonial site in which the archaeological record appears to indicate a material trade imbalance should be analysed in terms of the possibility that it was knowledge which was being traded for material goods, both in training and in ceremony. Taking knowledge into account may well balance the trade equation. As with contemporary oral cultures, great distances will be travelled to gain teaching. These journeys may well show up in the archaeological record as burials of people from distant locations. Travelling for trade, or for other forms of gathering, relies on navigational knowledge, waypoints or celestial guidance—all knowledge which must be stored in memory.

Recognising mnemonic technologies in the archaeological record

Enigmatic incisions or representations do not mean that the object is necessarily used to aid artificial memory. The difficulty in assessing non-utilitarian objects and ‘art’ works is briefly illustrated by a few examples.

The Navajo of the American Southwest use the calendar stone as mnemonic (O’Bryan 1993, p. 16). For each month indicated by a stroke on the stone, a song records the major seasonal and ceremonial events for that month. Songs and dances are performed at every ceremony and event. Thus the calendar stone acts as a table of contents for much of the

Navajo ritual cycle and therefore, for the knowledge system.

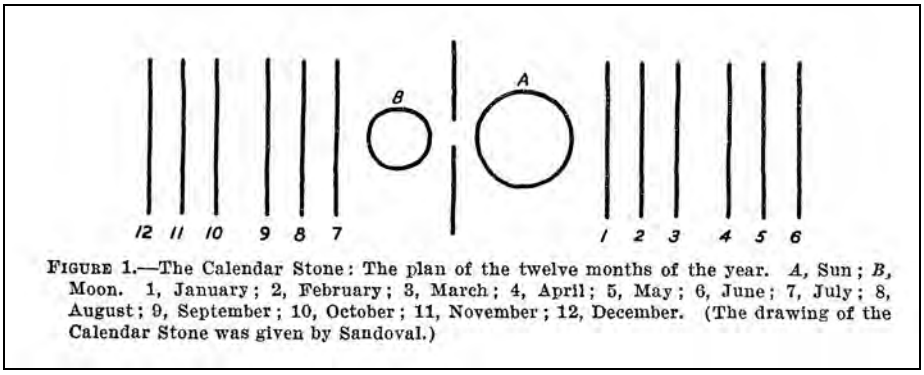

Figure 8.6 Diagram of Navajo calendar stone. Source: Aileen O'Bryan, Navaho Indian Myths, Dover Publications, 1993 [1956], p. 16.

Nine thousand year old incised stones from Neolithic Israel are incised basalt—an extremely hard stone. These markings were not made casually. They bear a superficial resemblance to the Navajo calendar stone. With no oral component, that connection cannot be made, no matter how rational it seems, without a great deal of further support.

Figure 8.7 Metropolitan Museum of Art, New York. The label read 'Pebbles with incised decorations, Basalt, Israel, excavated at Sha'ar Hagolan Neolithic Period, late 7th millenium B.C., Lent by Israel Antiquities Authority.' Photograph: Lynne Kelly.

An Arctic Eskimo bird effigy has a regular pattern, so there is no reason to assign a mnemonic purpose, even though it may serve as a simple reminder of some aspect of the oral tradition. There is an obligation to assume it is purely decorative unless the context gives an indication otherwise.

Figure 8.8 Arctic Eskimo bird effigy, Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

However, the Arctic Eskimo whale effigy below appears to be a purely decorative piece, until the design on the underside is viewed.

Figure 8.9 Arctic Eskimo whale effigy, Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

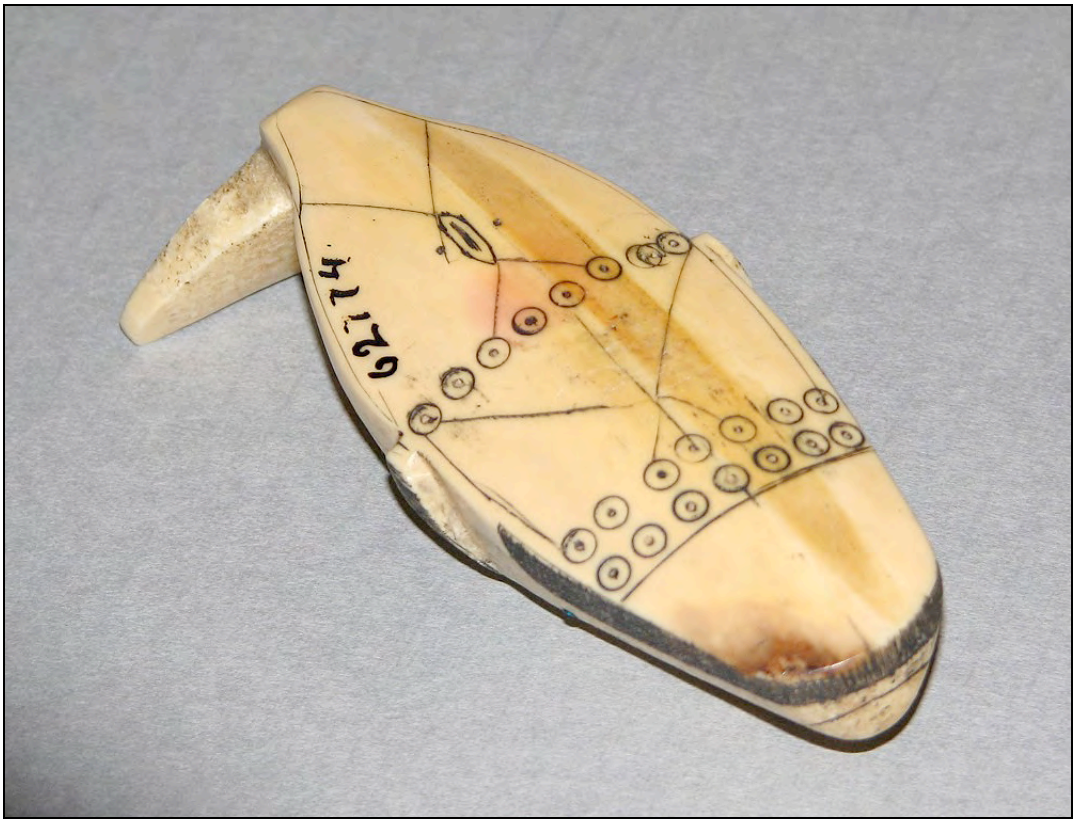

Figure 8.10 Arctic Eskimo whale effigy, underside of above. Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

Conclusion

This chapter has argued that there are a many aspects of the archaeological record which could be used to infer a socio-political culture based on the control of knowledge, the purpose of cultural landscapes as a knowledge spaces and the role of monuments as memory theatres. A single indicator would not be sufficient to make such a claim, but an archaeological package of most, if not all, of the ten indicators given above would certainly indicate that control of knowledge was a fundamental aspect of the culture which constructed the site under excavation.

In the following three chapters, the set of ten indicators will be used to explore three very different archaeological sites.

Chapter 9 - Chaco Canyon in the Ancestral Puebloan context

Introduction

The Ancestral Puebloan ruins in Chaco Canyon, in the New Mexican desert 150 miles northwest of present-day Albuquerque, had a profound impact on me due to their location, size and sheer beauty. But why would immense 'great houses' have been built in an isolated desert canyon? In this chapter an overview of the archaeology of the Chacoan culture will be presented and theories of the socio-political structure explored. In examining Chaco Canyon in terms of the ten indicators of knowledge as power, it will be shown that 'The Chaco Phenomenon' (Lekson et al. 1988, p. 100) shows all the indicators of being a knowledge centre, with large and small ceremonial rooms, known as kivas, along with plazas and earthen mounds, serving the role of knowledge theatres. This chapter focuses on what is known as 'the Classic Bonito phase' when the influence of Chaco Canyon was at its peak. Dates vary slightly between scholars, but Ruth Van Dyke gives the phase as being from AD 1020 to 1100 (2007, p. 2).

Although this approach will offer a radical new intepretation for the monumental site of Poverty Point (Chapter Ten), and for the monuments of Neolithic Britain (Chapter Eleven), it is more akin to a refinement of contemporary theories about Chaco Canyon.

Pueblo writer, Alfonso Ortiz writes that 'the broad contours of the Pueblo world view are probably little different from those of horticultural communities of similar scale, complexity, and environment the world over since Neolithic times' (1972, p. 141). Current research is working towards constructing a cultural history spanning AD 1300 to 1600, thus linking the archaeological record with the historic record of native peoples in the Southwest (Lipe & Varien 1999, p. 352). However, the details of Chacoan society cannot be formed by a simple replication of ethnographically recorded Pueblo cultures (Anschuetz 2002, p. 3.22; Cordell & Judge 2000, p. 19; Lipe & Hegmon 1989, p. 15; Sebastian 1992, pp. 4, 42; Varien, Naranjo et al. 1999, pp. 370-3 among others). As Van Dyke concludes, the 'configuration of society in the canyon, the organisation of labour, the reasoning behind the construction of massive, imposing, non-residential buildings cannot be neatly explained by analogy with other societies. Chaco must be understood on its own terms' (2007, p. 26).

Sebastian (1992, p. 5) argues that a 'more general, cross-culturally based analogy can provide us with a wider range of possible organisational principles' for Chacoan society. It is just such a set of principles, developed in Chapter Eight of this thesis, which will now be applied to the archaeological record of Chaco Canyon. Clearly, a detailed analysis is beyond

the scope of a single chapter. However, this analysis will serve to illustrate how an examination of the Chaco Phenomenon through the lens of primary orality may offer new insight into a complex and intriguing archaeological puzzle.

Why Chaco Canyon?

I first came across Chaco Canyon in Ruth Van Dyke's (2003) fascinating chapter, 'Memory and the construction of Chacoan society' in the book *Archaeologies of Memory* (Van Dyke & Alcock 2003). It was this book which convinced me that archaeologists had not yet fully engaged with the role of artificial memory in non-literate societies, nor with the extent to which formal learning takes place within oral cultures. Frazier describes as 'one of the thorniest, most disputatious issues of all: what kind of social system was Chaco, and how did all of that planning, work, and activity get organised?' (2005, p. 298). Sebastian writes: 'The critical question for understanding the AD 1020-1100 developments in Chaco Canyon is "What was the power base of political leaders during this period?"'(1992, p. 120). This chapter will argue that the mystery of the socio-political structure and purpose of the massive structures in Chaco yields a great many answers when viewed through the lens of primary orality.

A brief overview of Chacoan archaeology

Chaco Canyon was the focal point of the Ancestral Puebloan farming culture which flourished around 1000 years ago in the Four Corners region, the intersection of four states: New Mexico, Colorado, Utah and Arizona. This culture is often referred to as the Anasazi, a Navajo word, but is now generally acknowledged as being the ancestors of contemporary Pueblo peoples (Kantner 2004, p. 9) hence the now common use of the term, Ancestral Puebloan.

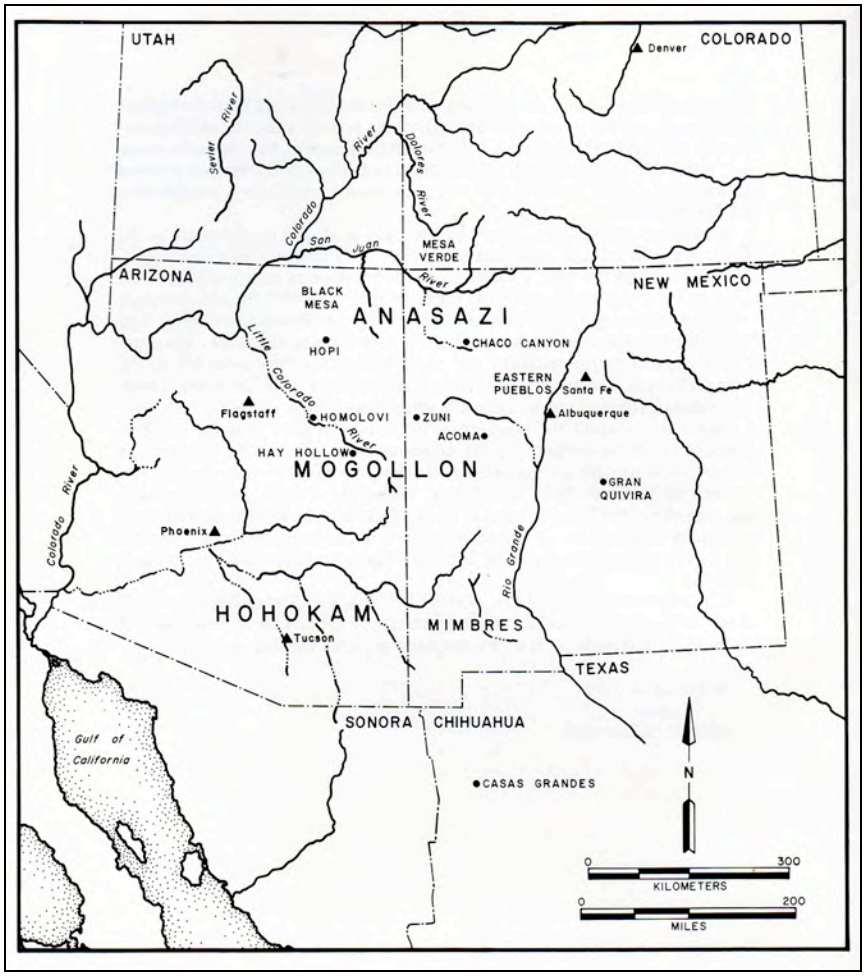

Figure 9.1 Map of the Southwest showing Chaco Canyon and the prehistoric cultural areas in the context of the contemporary Four Corners states: New Mexico, Colorado, Utah and Arizona. From Lipe & Hegmon 1989. Reprinted with permission.

The chronology of the prehistoric southwest is documented in many references with slight variation in the dates given, but not enough to have any impact on this argument. The chronology, adapted from Crow Canyon Archaeological Center (2011), starts with the hunter-gatherers of the Archaic period (5500 to 500 BC). The Basketmaker period (500 BC to AD 750) saw the first pottery, the start of settlement and the introduction of domesticated plants including corn, beans and squash. The elaborate coiled and twined basketry associated with this time gives the period its name. During the Pueblo I period (AD 750 to 900), the area consisted of a combination of large villages and dispersed settlements. The Pueblo II (AD 900 to 1150) saw people aggregating into larger communities centred on Chaco Canyon, with a change in the primary building materials from earth and wooden posts to stone masonry. It is this period which forms the basis of the following analysis. During Pueblo III (AD 1150 to 1300) large pueblos were built across the region, Chaco was abandoned and a huge population became based in the Mesa Verde region of south-western Colorado. By AD 1600,

this area had been abandoned and the Pueblo people migrated south eventually into large villages identifiable as present day Pueblo communities. All dates given in the rest of this chapter are AD.

During the Pueblo II period, faunal and plant analysis shows that wild species were being exploited as dependence on domesticates was increasing.

Great houses and kivas

Chaco Canyon experienced a dramatic increase in settlement between 875 and 925 (Van Dyke 2007, pp. 77-8). The Chacoan 'great houses' were constructed in regular bursts of activity from about 902 to 1115, the largest being Pueblo Bonito which covered almost 3 acres (Lekson et al. 1988, p. 100). The D-shaped building stood four or five storeys tall, and is estimated to have contained over 650 rooms, 45 smaller kivas, and two great-kivas (Lekson, 2000a, pp. 1-2).

> The great circular rooms or *kivas* within them were clearly intended for ceremonial purposes and at Chetro Ketl an impressive range of painted wooden artefacts hint at the decorative and ritual paraphernalia which may have been used, suggesting analogies with the use of the *kivas* in the Pueblo villages of the Southwest which continues to the present (Renfrew & Bahn 2008, p. 404).

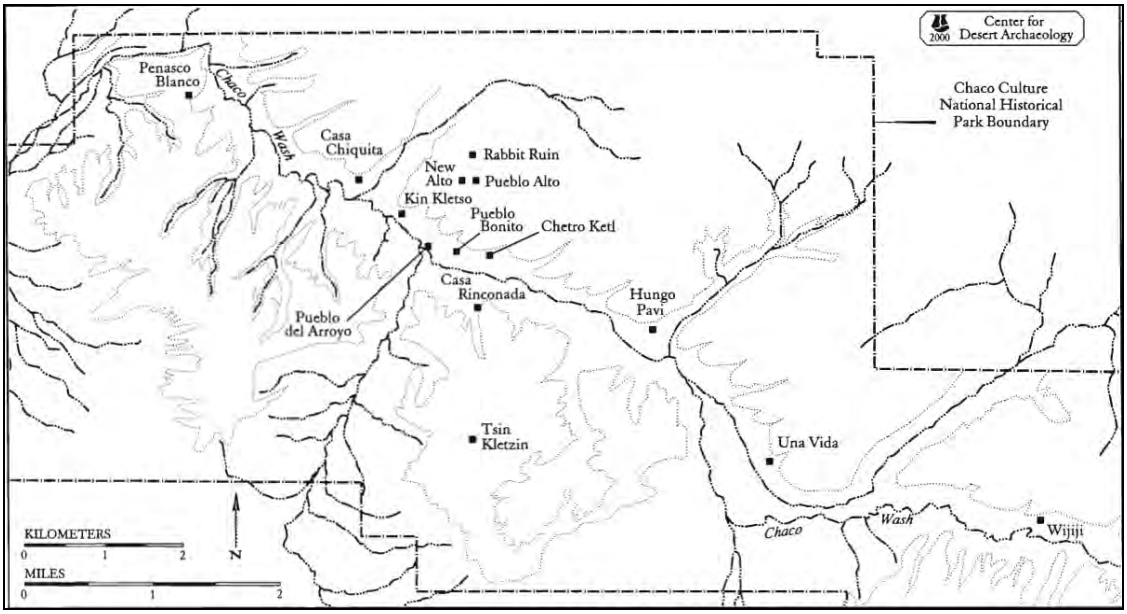

Figure 9.2 The location of the great houses in Chaco Canyon. Image © Center for Desert Archaeology. Reproduced with permission.

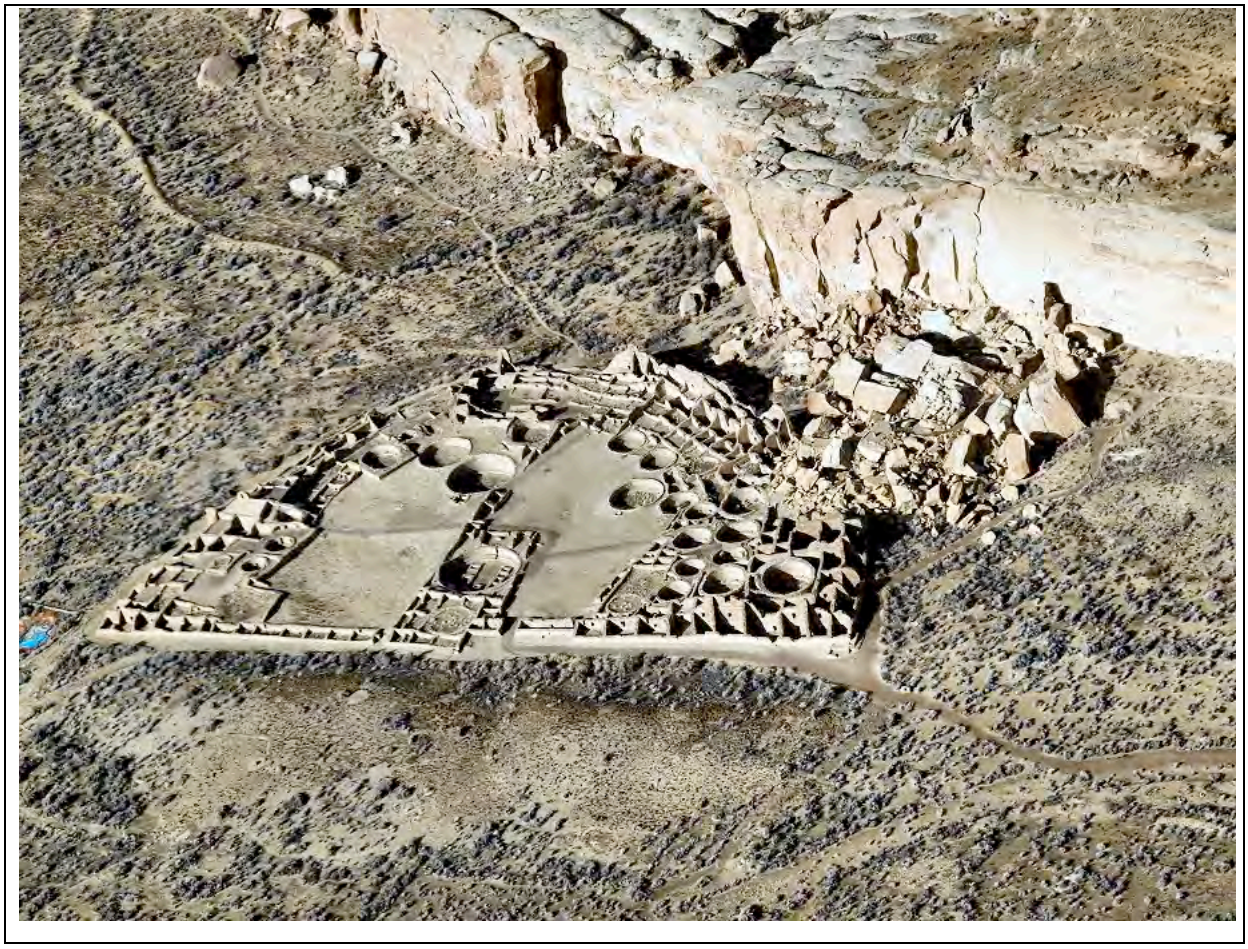

Figure 9.3 Aerial photograph of Pueblo Bonito, 2009. Photograph: Bob Adams, Albuquerque. Reproduced under Creative Commons Attribution-Share Alike 3.0 licence.

Figure 9.4 Pueblo Bonito, a digital reconstruction of the Great House just before abandonment. Source: NASA.

Figure 9.5 One of the plazas at Pueblo Bonito ruins. Photograph: Lynne Kelly.

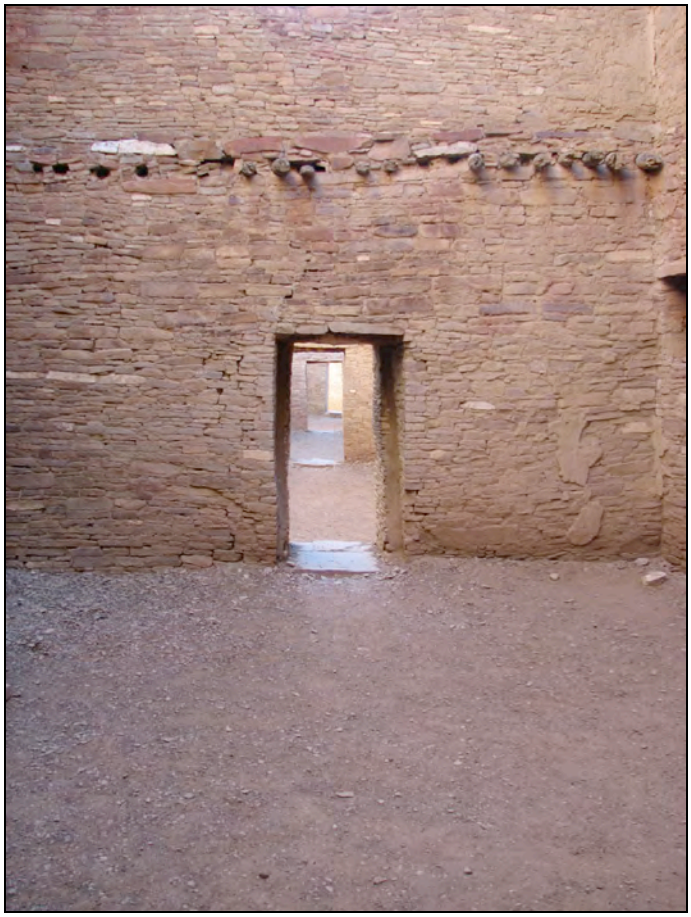

Figure 9.6 Looking through the doors in a series of ground floor rooms at Pueblo Bonito. Photograph: Lynne Kelly.

Great house builders used exaggerated mass, height, topographic elevation and associations with dramatic landforms to enhance the highly visible structures (Van Dyke 2007, p. 184) By the mid-1000s, Great Kivas had been added to the plazas of most great houses, and four 'isolated' Great Kivas had been constructed on the south side of the canyon (Van Dyke 2007, p. 21). Great Kivas are twice as large as other kivas, averaging from 15 to over 20 metres in diameter and up to 4 metres deep (Lekson et al. 1988, pp. 100-8; Van Dyke 2007, pp. 18, 75).

Figure 9.7 The isolated great kiva of Casa Rinconada, which was not part of a great house, showing niches around the walls. Photograph: Lynne Kelly.

Along with the 12 great houses in 'downtown Chaco', the 8 square kilometre area surrounding Pueblo Bonito (Lekson 1986, p. 272), 224 great houses are listed in the Chaco World database (Frazier 2005, p. 290). Great houses over a region of 100,000 square kilometres shared a similar design, but were also highly variable, indicating a local implementation of a common theme (Durand 2003, p. 142; Kantner 2003b, p. 217; Lekson 2000a, pp. 1-2; Mahoney 2000, pp. 15-16). Vivien (2000, p. 5-6) writes that the archaeological record indicates little difference in diet between the Chaco great houses and small communities in the region. However, a trend to higher quality corn was associated with the largest of the great houses from about 1050. This is suggestive of a more defined

dichotomy emerging between the ordinary people and an ever more restricted knowledge elite.

The pattern of a small number of major ceremonial centres with numerous smaller ritual sites, showing similar mnemonic technologies with local implementation, will also be reflected in the Poverty Point culture of the North American southeast described in Chapter Ten, and the British Neolithic in Chapter Eleven.

The Current Theories

Durand summarises the current theories about the purpose of the great houses under three broad categories: as residences, as redistributive centres, and as ritual structures, arguing that the evidence indicates that they were most likely ritual structures (2003, p. 142). The most widely accepted theory until recent decades was that Chaco Canyon was central storage site for the San Juan Basin serving as a redistribution centre, but given the size of the Chaco regional system, and the impractical nature of food transport over such distances, this has now been rejected by most archaeologists (Lekson et al. 1988, p. 109; Lekson 1999, p. 46; Sebastian 1992, p. 41). Most current explanations argue for Chaco Canyon as a central place for ritual gatherings with leaders' power legitimated through exclusive access to ritual knowledge[20].

Lekson argues that Chaco buildings were not residential 'pueblos' as up to 80 percent of the roofed space of buildings lacked any evidence of domestic functions (1999, p. 80). He estimates that the total population of Chaco Canyon was probably 2500 to 3000 people of which about half lived in great houses and the rest in unit pueblos, among a total population of the San Juan Basin in the tens of thousands (1999, p. 21). Lekson concludes that the great houses were home to a small and powerful elite numbering less than 1000, along with their retainers (1999, p. 141).

Flannery (1972) argues that attempts to define the prime mover(s) of cultural evolution have failed because they concentrate on exchanges of matter and energy and ignore the third requisite of cultural systems: information. Sebastian acknowledges the complexity and importance of information processing in the evolution of a cultural system, noting that increased information loads will lead to an increasingly hierarchical leadership structure (1992, pp. 66-7). She does not then take this argument further in her analysis of Chacoan culture. This chapter will do so.

[20] The argument for Chaco Canyon as a ceremonial/ritual centre is expressed in a variety of ways, the details of which are beyond this thesis, but are all consistent with the argument offered in this chapter. See for example Lekson 1999, p. 37; Saitta 1997; Sebastian 1992; Turnbull 2000pp. 22-3; Van Dyke 2007, pp. 3-4; Wills 2001; Judge 2004, p. 4.

Memory and knowledge in the Chacoan system

This chapter proposes that the powerful elite housed in the great houses of Chaco Canyon maintained their power through the control of knowledge, including a great deal of pragmatic information on which survival depended. A structured knowledge system would have been formally transmitted in both public and restricted performances. In Hopi oral tradition, Chaco Canyon (Yupköyvi) is described as 'a place where knowledge was to be shared' (Kuwanwisiwma 2004, p. 41).

Van Dyke describes the way the landscape of Chaco Canyon became increasingly formalised during the Classic Bonito phase with the construction of new great houses, along with shrines, staircases, mounds, ramps and linear alignments referred to as 'roads' (2007, pp. 18-21). As the power increased, so would the restricted nature of the performances. Van Dyke describes the way Chacoans formalised the design of Great Kivas and incorporated it into the plazas of many of the great houses during the Classic Bonito phase (Van Dyke 2007, p. 91). She writes that

> Visitors to Chaco received ritual knowledge and the benefit of participation in important ceremonies. In return, some could have contributed food, ceramics, lithics, or turquoise; others, lacking such material resources, could have contributed labour (Van Dyke 2007, p. 114).
>
> Memory would have been woven into community identity, as the outlier great house would have embodied the memories of group labour, gatherings, and associated events leading up to its completion…. The construction of memory–a social relationship to a real or imagined past–was an integral part of the eleventh-century Ancestral Pueblo worldview (2007, p. 192-3).
>
> Social memory involves the construction of a collective notion (not an individual belief) about the way things work in the past. Like us, past peoples reconfigured and reinterpreted the more distant past, selectively remembering and forgetting people and events to serve the interests of the then present…. Repetition and secrecy may be involved in the social transmission of knowledge about the past (2007, pp. 45-6).

My interpretation of Chacoan culture is in general agreement with Van Dyke, differing only in emphasis. As is argued throughout this thesis, repetition and secrecy are a critical aspect of the social transmission of pragmatic knowledge, which may well have been learnt

from past events. A change in emphasis is suggested here, to acknowledge that social memory is about far more than past events, the mythological realm often being considered to be contemporaneous with the present.

In addition, Van Dyke does not make specific reference to the many pragmatic aspects encoded in 'ritual knowledge', nor about formal memory training as presented in Part One of this thesis. The depth of scientific knowledge stored by oral cultures and the respect granted accordingly also needs to be considered. I contend that it would not only be memories of the past – oral history – that would have been recalled, but that knowledge of present practices, possibly encoded in stories of the past, would have been critical to survival. Formal artificial memory technologies would have been employed, which show up in details of the archaeology as described below. The basic level of knowledge was probably taught in the smaller great houses, with the highest level of initiation associated with the largest of the great houses in Chaco Canyon, especially Pueblo Bonito. Van Dyke asks:

> But how did ritual leaders come to power? Why was their authority perceived as legitimate? Why would people agree to act as subjects—that is, to participate in a situation which was to their social or material disadvantage? … —were the great houses, great kivas, roads, and earthworks stages for ritual events? (2007, p. 3).

Van Dyke concludes that 'Chaco presents an unusual instance of socio-political complexity in which ritual, not economics, serves as the basis for elites' power' (2007, p. 251). Although agreeing with this perspective on Chaco, I do not believe this is an unusual instance. Renfrew (2001, pp. 14-5) argues that Chaco was a Location of High Devotional Expression (LHDE), among parallels at the Ring of Brodgar and Stones of Stenness in the Orkney Islands of Scotland (see Chapter Eleven) and the *image ahu* of Easter Island (see Chapter Twelve). By including the cross-cultural generalisations made in Part One, this thesis will argue that a socioeconomic complexity based on knowledge conveyed in ritual can be found across these early settlement cultures.

Sebastian argues strongly that 'competition is *the* central fact of leadership' (1992, p. 71) [her emphasis] referring to a wide range of societies from Big Men of New Guinea to contemporary Western cultures. I would argue that the competition involved the control of knowledge

The ten indicators of knowledge as power

1. A stratified society with no sign of individual wealth or coercion

The organisation of labour, degree of planning, structuring of space and caches of exotic materials all point to a complex Chacoan political authority over a large region over a long span of time (Lekson 1999, p. 48; Sebastian 1992, p. 57). It is generally agreed that the time of great house construction in Chaco Canyon itself was a time of low violence; coercive force was not an integral part of Chacoan society (Frazier 2005, pp. 2, 74-82; Mahoney 2000, p. 16;). Pueblo Bonito has disproportionately few infants in the burial sample (Saitta 1997, p. 15), as would be expected if the privilege of burial at Chaco was awarded to members of the knowledge elite.

Social inequalities increased between ritual leaders in the great houses of Chaco Canyon and the other Ancestral Puebloans over the course of the tenth century (Van Dyke 2007, p. 98-101). During the latter half of the eleventh century, some elite burials occurred at Pueblo Bonito, in rooms that were nearly 200 years old at the time (Van Dyke 2007, pp. 121-2). In Room 33 of Pueblo Bonito, two males were interred with thousands of turquoise pieces (Saitta 1997, p. 15). However, the number of burials in great houses is so small that some researchers question that much can be concluded from their context (Saitta 1997, p. 5; Sebastian 1992, p. 51). Nevertheless, analysis of those interred in the great houses indicated that they had a better level of nourishment than those in the villages (Saitta 1997, pp. 14-5; Van Dyke 2007, p. 3).

It can therefore be stated fairly reliably that there was an elite with power in Chaco Canyon during the Classic Bonito phase, but that there is minimal, if any, sign of individual wealth or coercion. This chapter argues that power was due to control of knowledge, and the centre of the knowledge was Chaco Canyon. Knowledge specialists from the outliers would have come regularly to the canyon to maintain existing, or gain new, knowledge from the elite in the great houses, the implementation of knowledge spaces then localised in each outlier. Control of esoteric knowledge is so integral to the power structure in contemporary Pueblo society that Sebastian argues that ‘it would be surprising if such control will not component of ancestral Puebloan societies as well’ (2004, p. 95).

2. Large investment of labour for no obvious reason

Many writers make reference to the huge investment of labour involved in constructing the great houses (see for example Frazier 2005, p. 300; Lekson et al. 1988, pp. 100-2; Van Dyke 2007, p. 114). Estimations for building a great house of the size of Chetro Ketl, for example, are in the order of 50 million pieces of sandstone, with roofs and floors

made of 215,000 trees, some of them 25 centimetres in diameter, which had been cut and transported from as much as 80 kilometres away (Lekson et al. 1988, p. 102). It has been estimated that non-great house residents contributed up to 200,000 person-hours for each major construction project (Van Dyke 2007, p. 114). Yet Lekson et al. (1988, pp. 104-5) concluded that the great houses had each been home to no more than 100 people.

A strong case to justify such an immense investment of energy in such activities has not yet been made. However, if the Chaco great houses served a role as the focus of rituals which stored, transmitted and taught the corpus of songs encoding the entire formal knowledge system of the culture, then this labour input would be justified in the eyes of all members of the society.

3. Public and restricted ceremonial sites

Throughout the 900s, the ritual gatherings at Chaco gradually grew in size and prominence leading to a series of major construction events in the canyon during the tenth century (Van Dyke 2007, p. 100). All the larger great houses have a central plaza, a large open area within the buildings walls (Lekson et al. 1988, p. 105). Van Dyke suggests that the plazas were likely to have been open public spaces, while the interior rooms and kivas would have been restricted spaces, possibly with nested layers of access (2007, p. 121).

Along with plazas, mounds may also have provided public performance spaces. The platform mounds at Puebloan Bonito, for example, were rectangular, masonry-wall, adobe-surfaced structures, probably dating to 1075-1105 (Lekson 1999, pp. 93-40). Lekson et al. (1988, pp. 105-6) argue that, as not all the great houses had trash mounds, they reflect activity which is unrelated to daily occupation. Furthermore, the stratigraphy of the excavated mounds does not resemble domestic midden deposits (Van Dyke 2007, p. 129). Van Dyke writes that ceremonies performed on the mounds, with the backdrop of the massive great houses, would have been highly visible to a large group of people, providing ideal stages for public events (2007, p. 130). Excavations at Pueblo Alto indicated unusually high concentrations of broken utility jars, which Van Dyke interprets as strong evidence for periodic feasting (2007, p. 130). Wills (2001), however, argues convincingly that there is insufficient evidence that the mounds were deliberately built for performance, although he considers that they may have been employed for oratory once established. Although intriguing, further analysis of the role of the mounds in considered beyond the scope of this thesis.

Kivas provide an enclosed ceremonial space, restricting the numbers which can fit inside. Some of the kivas were semi-subterranean, located in the plaza area in front of the room blocks, while others were elevated, embedded among the rectangular rooms (Lekson 1986, p. 10). Although contemporary kivas are rectangular, there is documented evidence

from the time of Spanish occupation that at least some kivas from pre-colonisation were circular (Ortiz 1969, pp. 37-8).

Knowledge, in oral cultures, is stored and conveyed through performance. The theatrical atmosphere created in great kivas is evident from the acoustic impact, discussed below, as well as structures designed for performance enhancement. For example, a subterranean passageway leading into a screened area in the great kiva at Casa Rinconada would have facilitated surprise entrances at dramatic moments (Van Dyke 2007, p. 125).

Figure 9.8 The subterranean passageway at the great kiva at Casa Rinconada. Photograph: Lynne Kelly.

Archaeologists are arguing with increasing frequency that the Ancestral Puebloan structures identified as kivas were used for a broad range of purposes (Hegmon 1989, p. 10; Lipe & Hegmon 1989, p. 16). It is pertinent here to refer back to the discussion in Chapter Seven of Ford's (1980) research into the way rituals conducted in contemporary kivas dictate methods by which corn varieties are kept pure and planting optimised for production in unpredictable climate conditions. Ford argues that the system of classification that guides Pueblo agriculture 'undoubtedly evolved in early prehistoric times in the southwest' (1980, p. 28).

4. Monuments that reference the landscape

> No rain, short growing season, long nasty winter, no wood, no water–there's nothing to recommend Chaco but sandstone. Chaco was not "there" because of any overwhelming *local* advantage of its canyon; small populations lived there for centuries before Pueblo Bonito, but there were no physiographic quirks that presaged the Chaco phenomenon. As discussed above, I favour out-of-favour explanations that link Chaco's rise to its remarkably strategic position, central to the far richer margins of the Chaco Basin–location! location! location! (Lekson 1999, p. 135).

Renfrew and Bahn describe Chaco Canyon as 'a ritual centre in what was primarily a symbolic landscape' (2008, p. 404). Great houses were usually located in a prominent topographical location, even if this meant being exposed to extremes of weather (Kantner 2004, p. 74). Van Dyke writes that Chaco Canyon offered an excellent vantage point for prominent landmarks such as the volcanic plugs, buttes, mountain peaks, and mesas visible along the horizon (2007, p. 101) but goes further in arguing the architecture itself reflects the wider landscape and its sacred associations.

> Multiple levels are inscribed on a landscape by highly visible topographic features such as buttes and mountain peaks, and the pueblo itself represents this organisation in microcosm. Spatial organization is intertwined with cosmology, social organisation, and ritual practice (2007, p. 49).

Van Dyke concludes that the 'formal architecture of Chaco Canyon references the landscape, including the construction of line-of-sight connections with sacred landmarks' (2007, p. 60). The landmarks, so highly visible from Chaco Canyon, figure prominently in the oral traditions of contemporary Pueblo and Navajo people (Van Dyke 2007, p. 14). Although the contemporary meaning cannot be ascribed to the residents of the canyon a thousand years ago, the way in which landscape is used to recall meaning is a reasonable assumption.

Connected to Classic Bonito phase great houses are numerous cleared stretches of landscape, referred to as 'roads'.

> Chacoan roads are enigmatic: no wheeled vehicles, no horses or mules, no bulk transport other than porters. There was no obvious practical reason to construct a 9 m wide freeway where a foot path would suffice. Following straight lines, Chacoan roads

> climbed steep slopes when easier, porter-friendly alternate routes were close at hand. What are we to make of this? We can probably conclude that Chacoan roads served purposes beyond (but including) pedestrian travel (Lekson 1999, p. 129).

Chacoan roads were mostly short, localised features, although there were some longer segments which do not link communities nor locations of key resources—but they did appear to lead towards nearby landscape features (Kantner 2003b, pp. 212-3; Saitta 1997, p. 14; Van Dyke 2007, pp. 22, 145). Road construction involved the clearing of the road beds and creating staircases, causeways, ramps, grooves and linear mounds of earth, or berms, on either side (Lekson et al. 1988, p. 106; Van Dyke 2007, p. 145). The paucity of ceramics along the roads indicated they were not well travelled (Frazier 2005, p. 294). Van Dyke notes that there are about 305 kilometres of verified Chacoan roads with the longest segment being the 50.5 kilometre North Road (2007, p. 145). The North Road is not continuous, with gaps in it as long as 12.5 kilometres, areas of double or occasionally quadruple parallel segments (2007, p. 152). Van Dyke likens the five small masonry shrines, located on pinnacles or ridge crests along the route, to the shrines which often mark contemporary pueblo pilgrimage pathways (2007, p. 58). Renfrew and Bahn (2008, p. 404) argue that the roads are unlikely to have been constructed for utilitarian purposes, but for processional or ritual pathways. It is reasonable to consider the roads as processional memory tracks, much like a formalised version of the songlines or singing tracks discussed in Chapter Three. Nungarrayi, my Australian Warlpiri advisor, reminded me often of the mnemonic value of walking across a symbolic landscape in rhythm to the chants as they were being repeated. A similar role will be ascribed to the British Neolithic Avenues in Chapter Eleven.

5. Signs of a prescribed order—the Method of Loci

Referencing notable topological features provides a natural sequenced mnemonic structure, as discussed in Chapter Three. Chacoans positioned some buildings creating lines of sight to specific landforms which they marked with shrines and rock art (Van Dyke 2007, p. 141). Stone ‘circles’, usually ellipses of masonry, were constructed on good vantage points. Measuring up to 32 metres by 20 metres, but many much smaller, they dated to between 1000 and 1150. Stone circles were carefully sited to create lines-of-sight to great kivas, but hide great houses beneath the canyon rim. Moving the circle only a few metres would lose this combined effect (Van Dyke 2007, p. 155). The fact that shrines are located along pilgrimage routes (Van Dyke 2007, p. 152) offers a clear example of a prescribed order for rituals.

Less obvious architectural structures would also serve as loci for the art of memory, very much the way it was used in Ancient Greece. Recessed niches are found in regular

placement around the walls of the great kivas. For example, around the inside wall of the great kiva at Chetro Ketl, ‘there were recessed niches, each about a foot square, whose function was probably ceremonial’ (Lekson et al. 1988, p. 107) each potentially holding artefacts acting as mnemonic to one ceremony in the annual cycle.

Figure 9.9 Great Kiva at Chetro Ketl showing central hearth, post holes for roof supports, and what are thought to have been storage vats or ‘foot drums’. The regular niches around the walls are found in all great kivas. Photograph: Lynne Kelly.

6. Acoustic enhancement

> Great kivas were ideal performance spaces, and much evidence indicates that they were used for ceremonial events. Great kivas possess acoustic properties ideal for songs, chants, and dances. Floor vaults may have been used as foot drums, overlain with wooden planks that would make a booming noise when people jumped or danced atop them (Van Dyke 2007, p.125).

My own experiments in the reconstructed Great Kiva at Aztec Ruins showed that the acoustics of the structure from the central point were extraordinary. Anything I said, even quite softly, could be heard clearly at the edges, yet the same tone did not carry from other

locations within the kiva.

Figure 9.10 Reconstructed great Kiva at Aztec Ruins with person in the central location between what are thought to have been foot drums. Photograph © Andrew and Carol Phillips. Reproduced with permission.

Sarah Margoles, Park Guide at the Aztec Ruins National Monument, experiences the impact of the acoustics daily. She describes the experience:

> The acoustics are amazing. I give ranger talks in the Great Kiva once, sometimes twice a day. I cannot stand in the center of the kiva because the sound echoes in my ears ... in the center, I can't hear anything but my own voice surrounding my entire head (and everything sounds so much louder in the center too).
>
> A couple months ago, National Geographic came and videotaped pueblo dancers using the vaults in the Great Kiva as foot drums. They placed wooden planks over the vaults and stomped on the drums (3 men on each drum) in unison ... aww, the sound was amazing! [2009, pers. comm. [email] 25 October].

It has also been suggested that the canyon walls had distinctive acoustic properties which magnified the sounds of ceremonies (Lekson 2004, p. 29).

7. Astronomical observations and calendrical devices

If large numbers of people are gathering together from a wide area, then people must know in advance when to travel to the meeting place. If ceremonies are to be performed regularly in the annual cycle, then someone has to maintain a calendar in every community. If agriculturalists are going to optimise yields, they must plant and harvest in tune with the seasons. 'Agriculture in the desert is a tricky business at best; it would be staggering if Chaco had developed without some form of celestial observations and calendrics to mark the seasons' (Lekson 1986, p. 9) [his emphasis]. Malville, however, considers a ceremonial calendar was probably of higher priority in an area where soil moisture variations are too great for a purely calendrical planting regime (2004, pp. 88-9).

The development of highly accurate solar horizon calendars used by contemporary Pueblo sun-watchers possibly started as early as AD 1000 (Reyman 1980, p. 42). Solar and lunar markers were built into the architecture, or etched into the rocks, of Chaco Canyon. The petroglyph known as 'the sun dagger' at the top of Fajada Butte indicates that Chacoans marked solstices, equinoxes, and lunar standstills (Malville 2004, pp. 87-8; Sofaer 1999; 2008; Van Dyke 2007, p. 108).

Figure 9.11 Fajada Butte, showing location of the sun dagger. Photograph: Lynne Kelly.

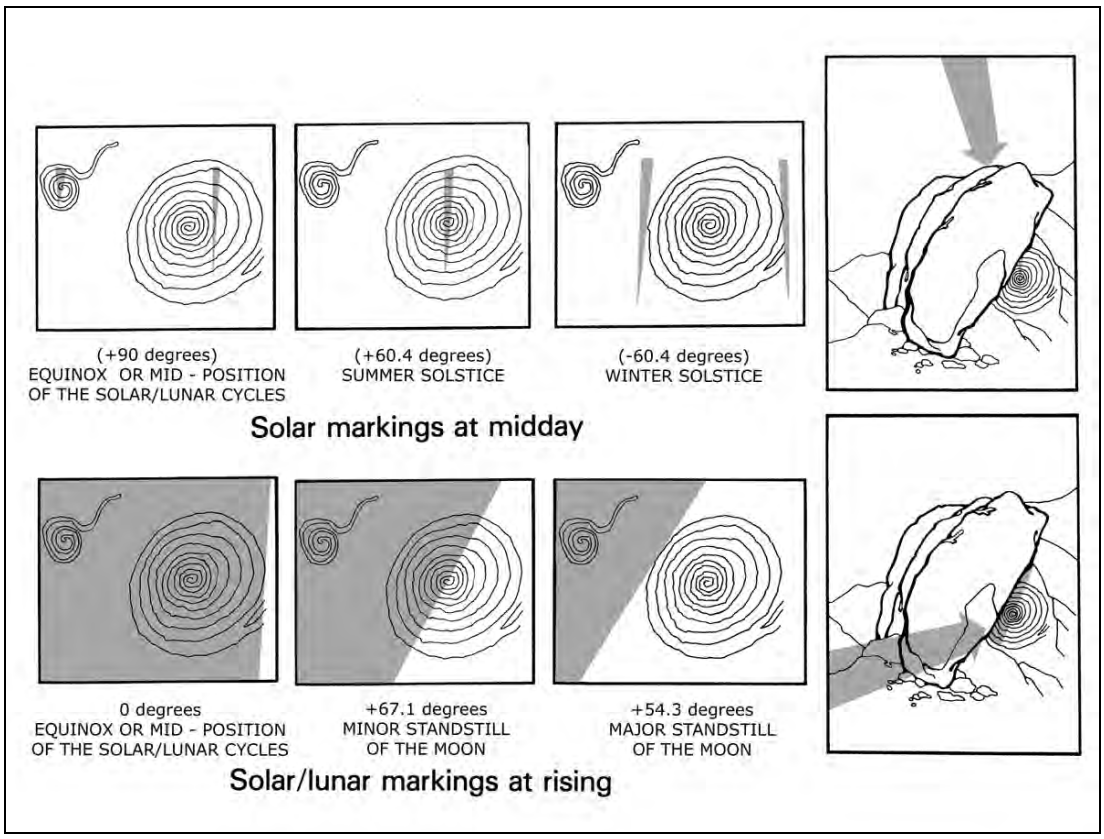

Figure 9.12. The 'sun dagger' light and shadows as they fall on the spirals etched into the rock on Fajada Butte. Image: The Solstice Project.

Many aspects of Chacoan architecture, along with some etchings, are claimed to be indicators of solar and lunar observations in Chaco great houses, some claims more widely accepted than others. For example, the alignment of walls in Pueblo Bonito correlate with equinox light and shadow movements, and with the daily east-west passage of the sun (Sofaer 1999; Van Dyke 2007, p. 117). Executive Director of Salmon Ruins, archaeologist Larry Baker described the experience of standing on a unique ceramic plaque which marked the exact position from which to observe the setting of the solstice sun down a wall at Salmon Ruins (2009, pers. comm., 19 October) while tree-ring dates suggest that construction Salmon may have coincided with lunar events (Van Dyke 2007, p. 208; Larry Baker, pers. comm., 19 October 2009). The rear wall of Chetro Ketl aligns precisely with the rising full moon at the minor lunar standstill (Van Dyke 2007, p. 117) while oddly angled exterior windows in Pueblo Bonito align with the winter solstice sunrise (Reyman 1976).

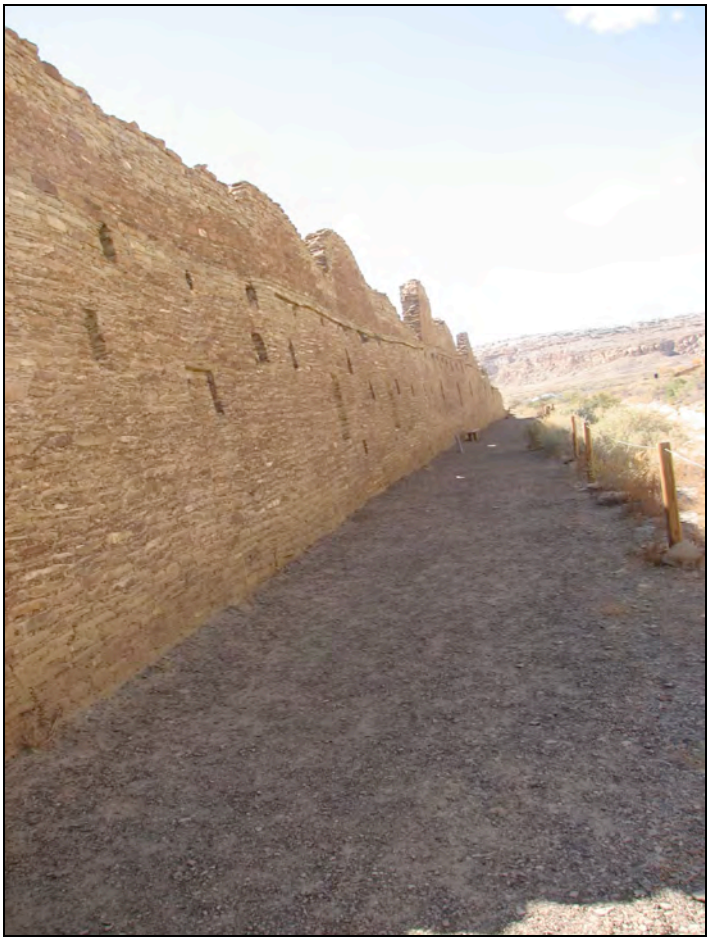

Figure 9. 13 The rear wall and Chetro Ketl which aligns with the rising full moon at the minor lunar standstill. Photograph: Lynne Kelly.

Figure 9.14. One of the oddly positioned exterior windows at Pueblo Bonito which aligns with the winter solstice. Photograph: Lynne Kelly.

At the Chacoan outlier, Chimney Rock, in south-west Colorado, a narrow ridge leads to a great house which provided an ideal location from which to observe the major lunar standstill as the full moon rises dramatically between the natural twin pillars (Van Dyke 2007, pp. 109-10), an event which occurs in an 18.6 year cycle.

Figure 9.15. The natural twin peaks at Chimney Rock outlier, which offer a lunar standstill alignment when viewed from the great house. Photograph: Lynne Kelly.

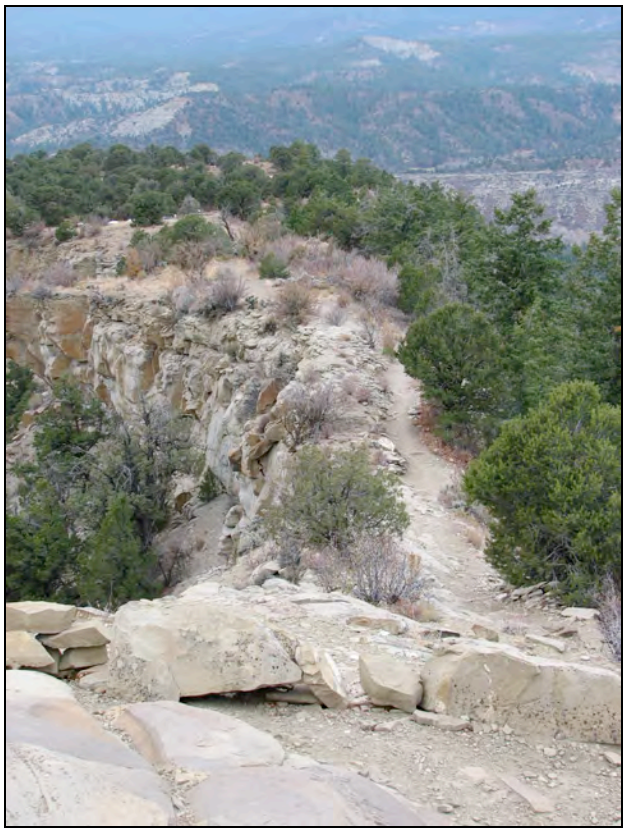

Figure 9.16. The narrow and restrictive ridge which needs to be climbed to reach to Chimney Rock, this view being from the great house. Photograph: Lynne Kelly.

8. Rock art as mnemonic

The vertical sandstone walls east of Penasco Blanco contain many petroglyphs typical of Chaco Canyon designs, but few other pictographs are known in the area (Brandt et al. 2008, p. 642). Rock art panels at Chaco Canyon include the spirals linked to the sun dagger, as described above, geometric and representational images, as well as representations of the flute playing kachina, now known as Kokopelli, a character who continues into contemporary Pueblo stories (Schaafsma 1980, pp. 134-142; Zeilik 2008, p. 202).

Many of the symbols in New Mexican rock art, such as those studied at the National Petroglyph Monument, contain images and symbols identifiable by contemporary Pueblo, as is extensively detailed in the National Parks Service report incorporating the views from many of the Pueblos (Anschuetz et al. 2002). It must be emphasised that interpretations are unlikely to be static, but the fact that contemporary Pueblo link the images to stories suggests that Ancestral Pueblo probably did the same.

Figure 9.17 Representational Ancestral Pueblo petroglyph from the National Petroglyph Monument, New Mexico. Photograph: Lynne Kelly.

Figure 9.18 Geometric Ancestral Pueblo petroglyph of a spiral from the National Petroglyph Monument, New Mexico. Photograph: Lynne Kelly.

Figure 9.19 Kokopelli petroglyph, Embudo, New Mexico © Einar Einarsson Kvaran, licenced under Creative Commons.

9. Enigmatic decorated objects

Large numbers of objects which have been interpreted as ceremonial paraphernalia have been found in the great houses, including wooden staffs, clay pipes, numerous carved and painted wooden objects, many brightly coloured, often representing birds, carved and inlaid stone and bone effigies, horns, hoops, discs, prayer sticks, lightning lattices and plume circles and tools, a basket covered with shell and turquoise mosaics and cylinder vessels, (Frazier 2005, p. 16; Sebastian 1992, p. 15; Van Dyke 2007, p. 108). Large numbers of Scarlet Macaws (*Ara macao*), native to Mexico and South America, were caged in rooms within Pueblo Bonito (Tyler 1979, pp. 26-7). Artefacts using macaw feathers were elite objects with a very restricted distribution (Lekson 1999, p. 52).

Vivien et al. (1978) give a detailed description of hundreds of apparently non-utilitarian wooden artefacts found in Room 93 of Chetro Ketl, a room which had the roof still intact, protecting the most comprehensive collection of such objects known from Chacoan sites. Mostly flat carved forms, many appear to be part of composites. The wooden objects are usually painted on both sides, decorations varying from simple colouration to quite complex designs. A number were mended, indicating their high value (see Vivien et al. 1978, figures A.9.a and A.16.h). Some of these forms, from the descriptions and images given, indicate that a mnemonic purpose is worthy of investigation. In particular, the zoomorphic wands (see Vivien et al. 1978, figures A.23 and A.24) and the decorated slats and plume circle (Vivien et al. 1978, Figure 2.7, A.31, A.32 and A.33) are topologically reminiscent of memory aids used in historically documented cultures.

Cylindrical black- on-white ceramic vessels are a form unique to Chaco Canyon and mostly found only in the great houses (Sebastian 1992, p. 15). There are indications that these jars were of great significance as they ‘were repeatedly redecorated, either by washing or scraping away the black-on-white designs or by re-slipping, repainting, every firing’ (Crown & Wills 2003). At Pueblo Bonito, a cache of 192 cylinder jars, out of 210 known examples, were located in a complex of rooms along with other prestige items. The rooms also housed the highly unusual wooden crypt of the two most elaborate burials in the canyon. The cylinder jars average 24 centimetres tall and 11 centimetres in diameter, with the painted decoration covering a range of styles (Lekson 1999, pp. 96-8). Traces of chocolate, a very rare substance at that time, have been found in the cylinder jars and nowhere else (Crown & Hurst 2009). Painted cups shown are spread all over the site, but the cylinder jars are found in a very skewed distribution.

Figure 9.20 Cylinder jar and cup. Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

Figure 9.21 Cylinder jar. Peabody Museum of Archaeology and Ethnology, Harvard. Photograph: Lynne Kelly.

In studying the markings, I could see that they were neither regular nor symmetrical. Each jar was different, implying that the each design may reference stories or song cycles, but a firm conclusion could not be drawn.

10. An imbalance in trade

The ‘evidence demonstrates that Chacoan material interaction was one-way, directed almost exclusively towards Chaco Canyon, and perhaps not very frequent’ (Kantner 2003b, p. 214). Turquoise came from the Santa Fe area of New Mexico, Colorado, Arizona and Nevada; macaws and other parrots, and copper bells from Mexico, up to 1,000 kilometres to the south; corn, thousands of pottery cooking vessels, wood, and lithic materials came from the Chuska Mountains, 75 kilometres to the west; shell came from the Pacific, the Sea of Cortez, California, Texas and Arkansas; flakeable stone was from around the fringes of the San Juan Basin (Cameron & Toll 2000, p. 9; Lekson et al. 1988, p. 108; Lekson, 2000a, p. 2; Sebastian 1992, p. 57; Van Dyke 2007, pp. 3, 22-5). There was no evidence that elite goods were being manufactured in Chaco Canyon (Cameron & Toll 2000, p. 9).

What did Chaco Canyon export in return? Although there is no evidence of an export of any material goods, the apparent imbalance of trade can be balanced if knowledge is accepted as a resource. Visitors during the Classic Bonito phase most likely contributed goods and labour in return for access to ceremonies, ritual and prestige (Toll 2004, p. 40; Van Dyke 2007, p. 102). It is reasonable to assume that the knowledge traded encoded a great deal of pragmatic and scientific knowledge on which survival depended, and that material goods and labour ‘paid’ for training in this knowledge for the knowledge specialists throughout the Chacoan world.

Conclusion

It is clear from the above analysis of Chacoan archaeology that to argue a socio-political elite based on the control of knowledge is a reasonable hypothesis. But unlike the general term ‘ritual knowledge’, this chapter proposes that the knowledge conveyed included, among much else, the pragmatic information on which survival depended. As mentioned at the start of this chapter, the argument presented here is a refinement of the broad consensus of contemporary southwestern archaeologist writings. It draws many parallels with the work of Ruth Van Dyke. Some of the concerns expressed about Van Dyke’s approach (Reed 2009, p. 549; Larry Baker 2009, pers. comm., 20 October) relate to suppositions left unresolved about the elite nature of the leadership in Pueblo Bonito. These concerns, I feel, are addressed by the arguments presented above.

Archaeologist, Stephen Lekson (1999) offers a detailed argument that Chaco Canyon

is the start of a cultural continuum focussed on a longitudinal meridian, sequentially linking the cultures of Chaco Canyon, Mimbres, Salmon, Aztec and Paquime (also called Casas Grandes). Lipe and Varien write that this 'remarkable proposition promises to set the agenda for big-picture thinking about Southwestern archaeology for the foreseeable future' (1999, p. 351). Lekson argues that 'The movement, up and down the meridian, *was not* a migration; it was a political manoeuvre, by a small but powerful elite' (1999, p. 96). He asks: '[w]hat was it, exactly, that was moving north and south along the Chaco meridian? Not hordes of people' (1999, p. 140). However, Lekson equates oral tradition with oral history (1999, pp. 143-4). By broadening his concept of oral tradition to a ceremonial system which encodes much pragmatic information, the arguments offered in this chapter may well be used to support Lekson's hypothesis. It is knowledge, and the associated mnemonic technologies, which may well be what was moving along his meridian.

Although this chapter could only be a starting point from which to analyse the vast corpus of material on Chaco Canyon, it is clear that many of the enigmatic aspects of the canyon archaeology are in strong agreement with the proposition that the socio-political system was one of an elite maintaining power through the control of knowledge.

Chapter 10 - Poverty Point in the North American Archaic context

Introduction

Poverty Point is a mound site developed at the end of the Archaic period, between 1800 and 500 BC (Jackson 1991, p. 266). Located on the Bayou Maçon, a small watercourse running parallel to the Lower Mississippi River in north-eastern Louisiana, it is named after a nineteenth-century plantation at the location (Gibson 1996). Poverty Point was the centre of a hunter-gatherer culture spreading over nearly 2000 square kilometres (Gibson 2001, p. 205). A unique set of six semicircular earthen rings and six mounds covered nearly 150 hectares make Poverty Point by far the largest of the sites associated with the culture (Jackson 1991, p. 267).

This chapter will argue that Poverty Point was the regional centre for gatherings which served a multiplicity of purposes under the control of a knowledge elite. It will be argued that the earthworks and the extensive range of decorated objects were integral to the way in which knowledge was stored, maintained and transmitted. It is not only the purpose of the mounds and ridges that this chapter will address, but the vast array of portable decorated objects. Specifically, this chapter will challenge the accepted wisdom that the decorated form of Poverty Point Objects (PPOs) were primarily clay cooking balls, and argue that they also performed a role as mnemonic to the knowledge system. ‘I suspect that we have conflated all roundish formed globs of loess to be PPOs for cooking, when that is not necessarily the case’ (Robert Connolly 2012, pers. comm., [email] 9 February).

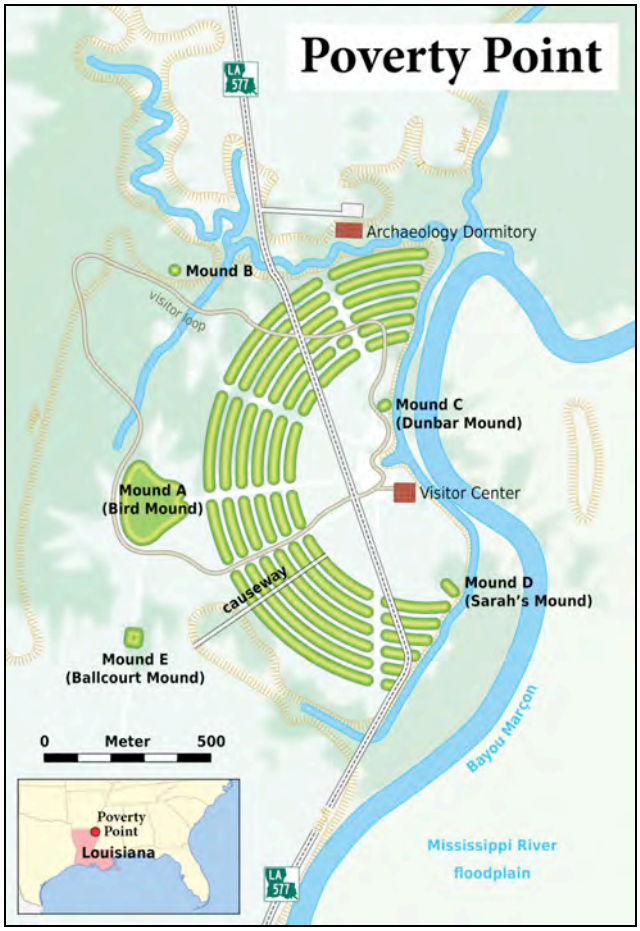

Figure 10.1 Map of the Poverty Point archaeological site. Image courtesy State of Louisiana National Park Service.

Why Poverty Point?

As I was forced to choose so few case studies from the many possible early settlement monumental sites, I selected to provide as much contrast as possible. Poverty Point offers a starkly different environment and culture to the British Neolithic and the Ancestral Puebloan. Poverty Point is among the largest hunter-gatherer manifestations found anywhere in the world (Ortmann 2007, p. 2). As part of thousands of years of mound building by hunter-gatherers, it also offers insight into the most fundamental of questions in the human story – why and how did humans adapt to a sedentary, and often agricultural, way of life?

Some researchers now question the image of 'simple hunter-gatherers' as antecedents to 'complex agricultural' societies, concepts which they claim are based primarily on flawed studies of the !Kung San Bushmen of the Kalahari (see for example Carr & Stewart 2004, p. 131; Kelly 1995, pp. 16, 27; Sassaman 2004, p. 229; Sassaman & Heckenberger 2004, pp. 216-7;). In fact, Sassaman (2004, p. 238) argues that the assumption that simple, egalitarian hunter-gatherer societies ever existed has to be questioned. The archaeology of the Poverty Point monuments demonstrates that essentially egalitarian hunter-gatherers attained levels of organisation and integration once only attributed to advanced farming cultures (Anderson

2004, p. 278; Gibson 2001, p. 12). In fact, Jefferies argues that agriculture, once considered the primary factor in the emergence of complexity, is now seen as an indirect consequence of a more sedentary lifestyle (2004, p. 71). White suggests that Poverty Point analysis indicates that mound-building may be a cause of complexity (2004, p. 12), an increase in social complexity being clearly evident during the Poverty Point period (Kidder 1991, p. 47).

This thesis argues that monumental forms, replacing the knowledge structure based in moving through the landscape, enabled a sedentary lifestyle necessary for developing or adopting domesticates. Unfortunately, information on the archaeology of Poverty Point is far less voluminous than that of the British Neolithic and Ancestral Puebloan sites. Only one percent of Poverty Point has been excavated (Gibson 1996) and Poverty Point was only first comprehensively mapped as recently as 1999 (Kidder 2002, p. 89). As is the case with any site, interpretation must be based on the specific archaeological evidence, not on direct analogy with any historical hunter-gatherer culture. ‘The precise kind of socio-political organization that existed at Poverty Point may have happened only once and only there’ (Gibson 1996).

Overview of Poverty Point archaeology

The tradition of building earthen mounds started in the Lower Mississippi Valley around 4000 BC (Saunders et al. 2005, p. 662). Watson Brake, an oval arrangement of 11 earthen mounds with connecting ridges, is the largest and most complex of the early mound sites. It was begun about 3500 BC, and built in stages for about 500 years before the site was abandoned. The tallest structure, Mound A, is 7.5 m high (Saunders et al. 2005, pp. 631-2). Sassaman (2004, p. 259) argues that the various well-documented early mound building complexes, including Watson Brake, were constructed according to a common plan. In walking the site with archaeologist, Dr Joe Saunders, I experienced a natural order provided by the oval arrangement, but also noted that the mounds are not easily visible, as would be implied by a plan view map. Currently, trees and distance obscure the mounds from beyond the site, enabling restricted activities to occur on the tops.

Figure 10.2 Approaching Mound A, Watson Brake. Photograph: Lynne Kelly.

Some researchers argue that the mound building tradition then disappeared for about a thousand years (Saunders 2004, p. 159; Saunders et al. 2005, p. 663) while others consider that, although not well documented, there is evidence to suggest that the construction of earthworks continued until the building of Poverty Point (Sassaman 2004, p. 259). Periodic flooding of the lower Mississippi River Valley provided an inexhaustible supply of fish in the backwaters and bayous (Crothers 2004, p. 95). Gibson describes Poverty Point area as a hugely rich environment, but where resource availability was impacted by 'hurricanes, floods, droughts, bugs, blights, and a host of other complications' (2001 p. 169) along waterways which were extremely difficult to navigate (2001, pp. 225-6). The environment will have demanded detailed knowledge of how to deal with, and navigate, a constantly altering massive river complex and its fauna. By 1500 to 1000 BC, relatively settled hunter-gatherer populations lived in long-term base camps or essentially permanent hamlets and small villages (Jackson 1991, pp. 266-7). This was the time at which Poverty Point was constructed and used.

As can be seen in Figure 10.1, Poverty Point earthworks consist of six concentric rings, or ridges, which end at the bluff. The ridges curve around a large, level open plaza, approximately 400 by 350 metres in size (Ortmann 2007, p. 18). The ridges are 1 to 3 metres high and 20 to 40 metres wide with total length of 18 to 21 kilometres (Kidder, Ortmann &

Arco 2008, p. 9). Five ‘aisles’ create gaps through the rings while an embankment, known as the Causeway, spans all six rings (Gibson 2001, p. 80) although other archaeologists are not convinced of the reality of the ‘northern aisle’, the elimination of which removes a great deal of the presumed symmetry of the site (Kidder 2002, p. 99). The ridges are no longer apparent from the ground due to centuries of ploughing. The earthworks were first noticed on a 1938 aerial photograph by archaeologist James Ford (Gibson 2001, p. 80).

Figure 10.3 Aerial view of Poverty Point, 1938. Photograph courtesy: United States Army Corps of Engineers.

The Poverty Point site involves several earthen mounds (see Figure 10.1). Exactly how many were contemporaneous with the rings is still a matter of debate. Kidder, Ortmann and Arco describe Mound A as an elongated cone, 22 metres high, which is attached via a ramp-like feature to a 10 metre tall flat platform. Stretching nearly 210 metres north to south and approximately the same distance east to west, they estimate the total volume of the mound at around 238,000 cubic metres (2008, p. 9). Lower Jackson Mound, and possibly Mound E, appear to be earlier Archaic constructions suggesting that Poverty Point builders incorporated older, venerated structures, thereby helping to preserve ancient tradition (Gibson 2001, p. 99).

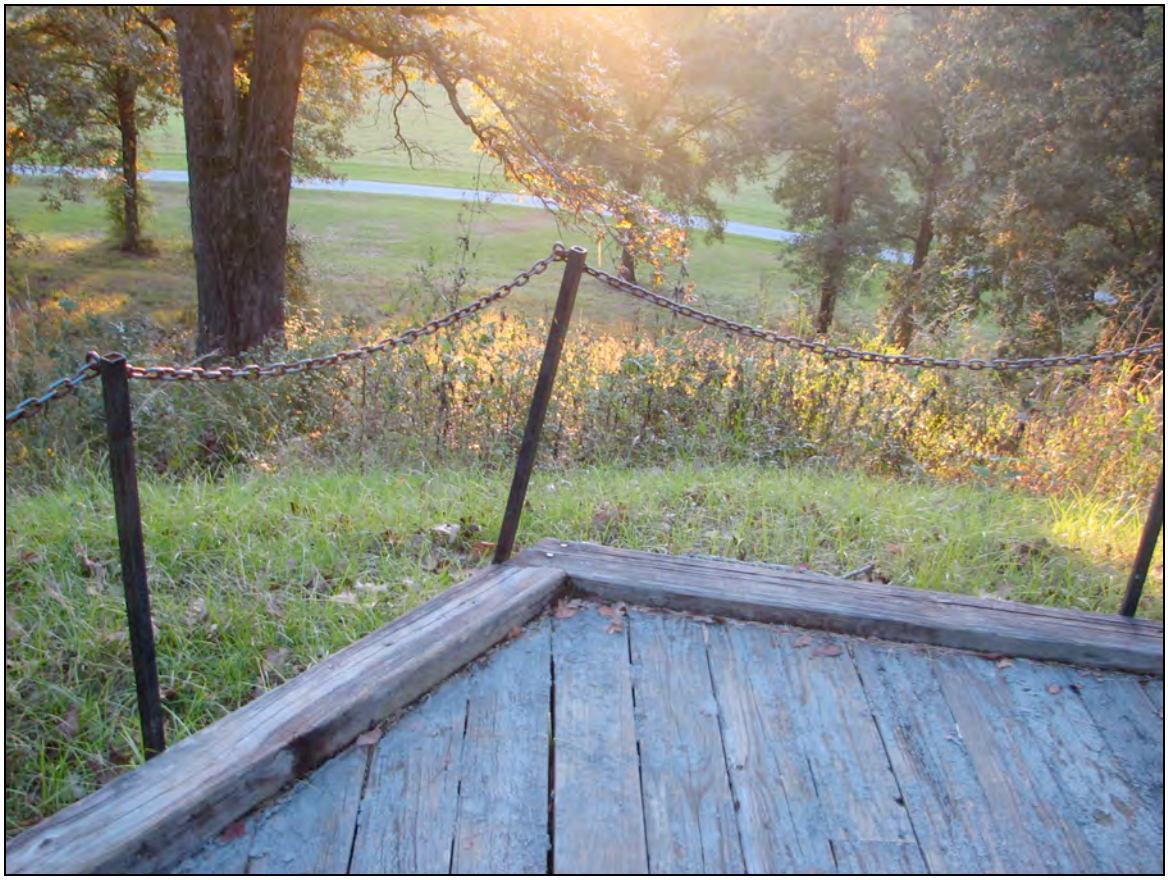

Figure 10.4 View from Mound A indicating that performances on the top could not be seen from below, 2009. Photograph: Lynne Kelly.

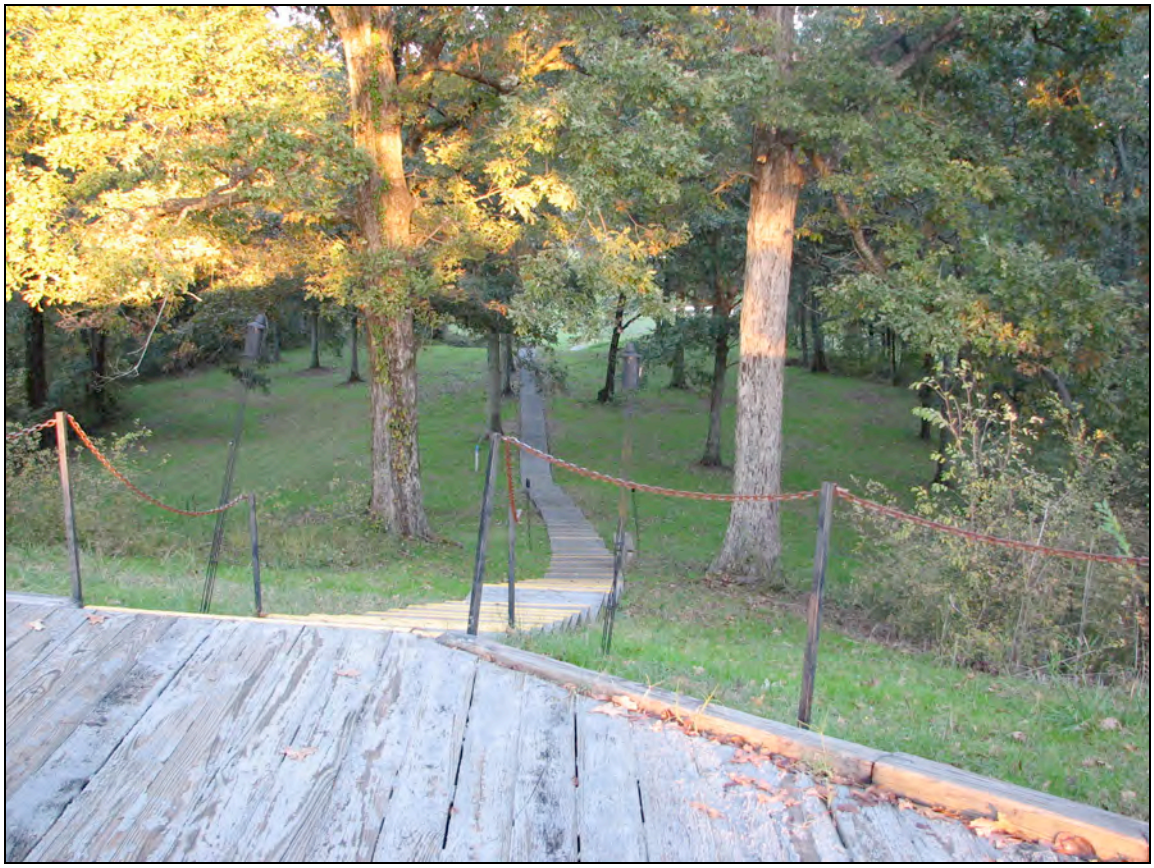

Figure 10.5 View from the top of Mound A looking down the ramp to the plaza, 2009. Photograph: Lynne Kelly.

Smaller sites are recognised as being affiliated with Poverty Point due to the presence of great numbers of non-local materials and manufactured items characteristic of Poverty Point, such as PPOs (Jackson 1991, p. 270; Lehman 1991, p. 57; Webb 1968, pp. 297-304)[21]. The number of associated sites, over an area of 1800 square kilometers, is now more than 100 (Ortmann 2007, p. 11). There is significant variability within the Poverty Point culture sites (Kidder 1991, pp. 27, 46), which indicate that 'individual complexes were part of a regional landscape of monument construction' (Sassaman 2004, p. 260). Turnbull (1989, pp. 20-3) explores the detailed knowledge and ability to map the Upper Mississippi and lower Missouri as presented by Non Chi Ning Ga, an Iowa Indian chief, as part of a land claim in Washington, 1837. A similar detailed understanding of the Mississippi and its many tributaries must have been stored by Indians of the Late Archaic if they were have any chance safely navigating to establish the regional links indicated by the archaeological record.

As regional centres appear to have served as independent entities with local political autonomy, Kidder writes that 'it was an integrative phenomenon that we are seeking to understand… Poverty Point could only retain its position given the acceptance or acquiescence of surrounding groups' (Kidder 1991, p. 48). It is argued here that it was the system of knowledge, and the associated power, which acted as the 'integrative phenomenon'.

The Current Theories

Why were the mounds and rings built at Poverty Point? There is no consensus on what the purpose might be (Saunders et al. 2005, p. 633). One theory held that the earthworks were built as protection from flood, but this has now been rejected (Pauketat 2004, p. 26). Nor were they burial mounds (Gibson 2001, p. 87). In fact, no Poverty Point burials have ever been identified (Gibson 2001, p. 150). On a broader scale, Sassaman notes that burials and habitation were absent from Archaic shell mounding as well (2008, p. 7). Although there was extensive long-distance trade at Poverty Point, Gibson notes that there is no evidence of pre-Poverty Point mound builders trading durable goods (2004, p. 258), hence it is likely that trade was not a primary cause of mound building.

Gibson considers that the purpose of the mound-building was linked to gratitude and benevolent obligation (2001, p. 208; 2004, p. 257). 'No greater monument to the power of kindness was ever built' (Gibson 2001, p. 229). Appealing though this concept might be, there is no ethnographic evidence of societies who expend a huge amount of energy on kindness and generosity for no return. Gibson also considers the Poverty Point rings to have

[21] For a detailed discussion of the Claiborne site see Bruseth (1991), Insley see Kidder (1991), Caney Mounds see Gibson (1991) and for Jaketown see Lehman (1991).

been built to act as magical protection against malevolent spirits (2004, p. 268) indicating that Poverty Point inhabitants had become extremely fearful, possibly due to the sudden increase in long-distance trade (2001, pp. 38-9). Again, without ethnographic analogy nor any sign of trauma in the archaeology, this theory can only be considered highly speculative.

There is much debate about whether Poverty Point was a town or vacant ceremonial centre (Gibson 2001, p. 99). Gibson believes it was definitely a large settlement with housing on the rings (2001, p. 105) although he admits that there is no archaeological evidence of buildings (2001, p. 38) despite the hundreds of post-moulds scattered across the rings, plaza and on several floors in Mound C (2001, pp. 100-1). Sassaman writes that there is no direct evidence to suggest that a large population resided there year-round, favouring a vacant ceremonial centre hypothesis (2004, p. 263). In fact, Jackson (1991, p. 270) argues that a permanent town comprised of several thousand hunter-gatherers would be difficult to support economically and would eventually result in significant local environmental degradation, for which there is no evidence. For the purposes of this thesis, Poverty Point will not be considered as a large town, but as a site visited regularly and possibly supporting a small resident population.

Gibson argues that because building ‘earthworks–big ones like Poverty Point’s–was simply incompatible with temporary economic incentives and social neutrality’ Gibson 2001, p. 108), Poverty Point must have been a large town. However, as shown in Chapter Two, due to the fundamental importance of gatherings to oral cultures, massive energy expenditure is not incompatible with temporary settlement, and the resulting economic benefits and social neutrality is far from temporary. Gibson also rejects claims that Poverty Point was a vacant ceremonial centre ‘given the extensive midden and its secular-looking trash … most of the trash consisted of cooking-ball fragments’ (2001, p. 105). It will be argued below that although some of the PPOs may well have been cooking balls, the interpretation that they all were is not consistent with the archaeological evidence.

Trade Fair

Jackson argues that Poverty Point was the site for intersocietal trade fairs. He defines a trade fair as

> a periodic, large, spatially and temporally predictable gathering of unrelated hunter-gatherers, often representing ethnically and linguistically distinct groups. During the course of these gatherings, at least some part of the interaction is the exchange of goods (1991, p. 266).

Jackson compares his trade fair model to Australian Aboriginal corroborees noting that 'trade routes transmitted a wide range of articles, including food, manufactured objects, shells, stones, minerals, and other raw materials, even songs and corroborees (festivals with songs and dances)' (1991, p. 274). He also likens them to the gatherings which depend on resource surplus, such as that surrounding the migration of Bogong moths discussed in Chapter Two.

> The Poverty Point archaeological record is a monument to the generally underrated capacity of egalitarian social forms and an indication that archaeologists ought to consider intersocietal interaction the norm rather than the exception among small-scale societies (Jackson 1991, p. 280).

As has been shown in Part One of this thesis, the songs, rituals and dances performed at major gatherings and smaller rituals serve many social needs including encoding the formal knowledge of the culture, which must be repeated regularly to be retained and traded. The conceptualisation of Poverty Point in this thesis is as a gathering site incorporating formal mnemonic structures and objects. Although there are similarities to Australian Aboriginal practices, Poverty Point must be interpreted on its own unique archaeology. Having said that, Jackson's trade fair model is the closest of the current models to that being proposed here.

There are objections to Jackson's trade fair model. Crothers is 'reluctant to ascribe that level of organised economic activity in a foraging mode of production' (2004, p. 95). Based on the Australian experience, I feel no such reluctance. Gibson argues that massive earthworks are not consistent with the notion of a temporary gathering involving independent people who he feels would be unlikely to cooperate in such a huge undertaking that did not directly facilitate exchange (2001, p. 108). However, if Poverty Point was in fact a ceremonial centre with the trade item of highest value being knowledge, as this thesis proposes, then Gibson's objections no longer stand. Gibson also rejects Jackson's trade-fair model because there is too much exotic stone and domestic refuse remaining (2001, p. 106). As stated above, this thesis rejects the concept of PPOs as domestic refuse, while it would be exotic stone which was traded for the right to participate in ceremony, public and restricted, and in this way share, transmit and gain knowledge.

Russo (1994b) suggests that mound construction served to integrate the society, representing a new form of social organisation by hunters and gatherers while Jefferies (2004, p. 72) argues that elites emerged in early sedentary hunter-gatherer societies due to their role as intermediaries with other local groups in forming social networks. This thesis would agree

that the mounds were part of the process of wide-area integration and networking, but see that as only part of their role.

It is now generally accepted that 'the purpose of the mounds was mainly (perhaps wholly) ceremonial' (Saunders et al. 2005, p. 663). This thesis proposes that the earthworks were structures which reflected the levels of the knowledge system, and the post-moulds may have held poles, carved or painted much like historically recorded totem poles. As discussed below, some of the post-holes in the plaza formed circles, which were apparently unroofed, much like the many timber circles from the British Neolithic (Chapter Eleven) and the much later timber circles at the massive mound builder site of Cahokia in Illinois which Pauketat likens to the British henges (2004, p. 75; 2009, pp. 63-5).

The ten indicators of knowledge as power

1. A stratified society with no sign of individual wealth or coercion

The massive Poverty Point earthworks are testimony to the fact that there was some form of leadership at work. However, there is no evidence of individual wealth. The 'restrictive distribution of exotic artefacts expected in a chieftain is not in evidence' (Jackson 1991, p. 271). Sassaman and Heckenberger write that

> Poverty Point has simply not produced evidence of the suite of traits expected of complex societies, notably food production, social hierarchy, and political authority… In these precocious cultural developments, we see a hint of complexity (monumentality) coupled with an economy (generalised foraging) and form of sociality (egalitarianism) that are presumed antecedents of complex society (2004, p. 214).

A number of researchers refer to this phase as 'transegalitarian', which Sassaman writes 'refers to societies that are neither egalitarian nor politically stratified' (2004, p. 250).

2. Large investment of labour for no obvious reason

The monumental earthworks involved the moving of between 667,000 and 750,000 cubic metres of earth, dwarfing all other sites of its age (Gibson 2004, p. 265; Saunders 2004, p. 158), although Ortmann claims the total volume of earth moved may be more than a million cubic metres (2007, p. 17). Gibson's labour estimates indicate over 7 million work-hours invested in construction. To complete the earthworks in a single generation of 30 years, Gibson estimates that 500 people would have needed to work between one and two months a year (2001, p. 109). Yet, '[d]espite nearly 50 years of systematic research at the Poverty Point

site, the role and function of mounds at this large earthwork complex remain essentially unknown' (Ortmann 2007, p. 3).

3. Public and restricted ceremonial sites

The central plaza provides a contained and ample public performance space. It is likely that the ridges in some way acted as mnemonic pathways, again enabling some level of restriction or structure to the knowledge being chanted. However, it is the mound platforms which offer restricted spaces in a landscape which provides neither caves nor hills, and without stone to build permanent buildings. Mound top sacred and ceremonial performances are indicated by the materials found on the mounds as well as on the rings, which are consistent with the body painting and ceremonial ornaments used among historic tribes (Gibson 2001, p. 88-9). From the top of Mound A, even with the erosion since Poverty Point times, it was clear that performances there could not be seen by people in the plaza or at ground level (see Figure 10.4 and 10.5).

4. Monuments that reference the landscape

In the extreme flatness of the Louisiana landscape, it is hard to imagine how to identify reference to the landscape in the monuments. The landscape is dominated by the Mississippi River. It could be argued that the ridges along with mounds C and D make reference to the river, the flood plain, and Macon Bayou.

As will be discussed further below, a wide variety of stone types were brought from long distances to Poverty Point from locations where there are no trade items from Poverty Point, nor any Poverty Point objects (Gibson 1996). However, should the rocks be symbols of the landscape places from which they originated, collected on pilgrimages to those locations, then it would be expected that there would be no return goods. The lack of Poverty Point objects is consistent with the argument made below that the interpretation of these objects as primarily cooking balls needs to be re-examined.

5. Signs of a prescribed order—the Method of Loci

The sequence of mounds provides a prescribed order in a well-defined set of loci. It is suggested here that the earthen rings, unique to Poverty Point, also offer a set of very clearly defined sequenced loci. However, such a claim would be purely speculative at the time of writing due to the lack of distribution data. Archaeologist, Dr Robert Connolly writes that '[w]hat is missing at this point in time is the tedious, but very doable reconstruction of artifacts through space and time at PP' (2012, pers. comm., [email] 10 February).

A large number of post-holes have also been found in the ridges (Gibson 2001, p. 102) and on several building stages of Mound C, one of 3 platform mounds (Gibson 2001, p. 38). It

is likely that the posts were decorated, as are totem poles, with a series of images mnemonic to the stories related to that post. Gibson describes ‘fire pits’ directly superimposed upon each other, giving a specific location in the rings, despite there being a ‘foot-thick layer of dirt’ between the pits (Gibson 2001, p. 103). What is known of the archaeological record is consistent with the concept of the ridges being used as a sequence of loci for teaching and maintaining the knowledge system, under the control of a knowledge elite, who possibly also lived on the ridges. This seems the most obvious reason for building segmented rings of different heights, containing posts which do not appear to have been part of buildings.

Circles of post-holes were excavated in the plaza during 2009. Site archaeologist, Dr Diana Greenlee described the results. ‘The circles, or at least some of them, are clearly post circles. Big, deep posts -- 65 cm diameter posts sunk 2 m deep’ (2009, pers. comm., [email] 8 September]. A circular sequence of posts representing the annual cycle is the logical topology.

6. Acoustic enhancement

No experiments have been done looking at the acoustics of the structures in the form they would have taken in the Late Archaic. As the site retains none of the original rings or buildings and only some of Mound A, there is no way at present to explore the acoustic properties of the monument as it was when being used.

7. Astronomical observations and calendrical devices

As it appears likely that Poverty Point was primarily used by mobile hunter-gatherers, it would be unlikely that solstitial observations would be represented as these require repeated observations from a fixed position. Unfortunately, celestial knowledge based on stellar observations is much harder to detect in the archaeological record, often being encoded in mythology and therefore represented in mythological form.

Alignments have been claimed for Poverty Point. Webb (1968, p. 317), Brecher and Haag (1980; 1983) and Patten (2007) argue that mound alignments, aisles and / or posts in the plaza offered astronomical markers. However, other researchers (Purrington 1983; Kidder 2002, pp. 98-9) dispute these claims, arguing that the alignments can be made due to the ability to manipulate the many lines which can be drawn through aisles and mounds.

Sassaman (2004, p. 260) writes that ‘it stands to reason that mounds were arranged for astronomical or calendrical purposes’ but the evidence is lacking. Calendrical devices are hard to identify. Located in the ‘fly though’ of many migratory birds, it would be likely that they, or other migrating animals, were used as calendrical measures, as is the case in historic cultures (see for example Majnep & Bulmer 1977, pp. 126-8). It would be worth examining

the representational artefacts from this perspective, but without the oral component, it is likely that any conclusions would be highly speculative.

8. Rock art as mnemonic

Rock art does not exist at or near the Poverty Point site as there is no rock, no caves, and thus no surfaces which would lead to the permanent record of painting or incision. It may be for this reason that there is such a proliferation of portable decorated objects.

9. Enigmatic decorated objects

It is in the area of decorated objects in which Poverty Point offers an extraordinarily large number of artefacts (Gibson 2001, p. 148). Many solid stone objects have been found but 'utilitarian functions for these small objects are hard to imagine' (Gibson 1996). It is argued here that the purpose of at least some of these objects was as mnemonic devices for the knowledge system, the disproportionately large number found being consistent with the concept of Poverty Point as a knowledge centre. Although some of the objects, such as the figurines, may have made reference to a single story or aspect of the mythology, it is suggested that the non-representational objects were used in groups. These are conceived to be collected in bags, much like the 'medicine bags' described in Chapter Three, which contain sets of objects to ensure each aspect of the knowledge was chanted or sung. It is also likely that the objects were placed in different arrangements to act as a sequenced prompt for verses of the knowledge, as for the Ifà divination system described in Chapter Three. Using a set of miniature Poverty Point Objects (PPOs), as will be described below, I found they were perfectly sized and decorated for such a use.

Some of the engraved or decorated objects from the Southeast Archaic phase have a clear utilitarian or decorative role, such as the engraved bone pins (Jefferies 2004, pp. 73-85). However, the collection on display in the museum and stored in the laboratory at the Poverty Point State Historic Site includes many enigmatic decorated objects.

> Other polished stone objects included small geometrics such as cubes, discs, ovals, spheres, cylinders, cones, and triangles, as well as a crescent, a tetrahedron, and a small cup. The lack of perforations or grooves lessens the likelihood that they were ornaments meant to be worn in public and raised the likelihood that they were charms or fetishes meant to be encased in medicine bundles (Gibson 2001, p. 151).

Figure 10.6 Enigmatic decorated objects on display in the Poverty Point Visitors' Centre. Photograph: Lynne Kelly.

Figure 10.7 One of the many and varied engraved stone objects on display in the Poverty Point Visitors' Centre. Photograph: Lynne Kelly.

Stone artefacts

A wide variety of stone artefacts are found at Poverty Point and related sites, but there is inconsistency between references about the use of these objects. Many are assessed as being weights for atlatls (spear throwers) or fishing nets. Brookes argues convincingly that, despite the widespread belief, bannerstones were not used as atlatl weights. Had adding weights been of benefit, other cultures who depended on atlatls surely would have discovered so, yet none of the many other cultures world wide who used atlatls added weights (2004, pp.104-6). Some perforated decorated objects are described as gorgets, an object worn around the throat (see for example Webb 1968, p. 315).'There are 617 whole or fragmentary polished stone problematical items or atlatl weights from the Poverty Point site, of which nearly 500 are gorgets' (Webb 1968, p. 315). Repair holes are frequent in gorgets (Webb 1982, p. 57), a fact which is inconsistent with their use as atlatl weights, but is consistent with the use as a mnemonic aid.

Figure 10.8 Decorated 'gorget' fragment at the Poverty Point laboratory. Photograph: Lynne Kelly.

Figure 10.9 Decorated and repaired 'gorget', at the Poverty Point laboratory. Photograph: Lynne Kelly.

Gibson (2001, p. 146) writes that plummets are often assumed to be sinkers for fishnets or as bolases for hunting waterfowl (see for example Webb 1982, p. 56), yet argues that they would not work as a bolas. He also asks why plummets were made from long-distance exchange rock, often refined and polished, and sometimes elaborately engraved 'when practically any heavy, rough, missile-shaped rock would have kept nets unfurled?' (Gibson 2001, p. 147). Webb writes that 'plummets of hematite and magnetite, usually including perforated forms, are exceeded in popularity and wide distribution only by baked clay balls' (1982, p. 56). Webb refers to numerous polished stone tools, 'crude greenstone celts, adzes, or hoes' as 'puzzling' and 'too crude and soft for effective use, yet they are often fragmentary or badly battered' (Webb 1982, p. 54). As for similar items in British Neolithic sites, it is argued here that these are ceremonial objects which make reference to the source in the landscape, and would thus be integral to the purpose of Poverty Point as a knowledge centre.

Representational objects

Many representational objects are also found at Poverty Point, which are consistent with the use of representations of real animals and mythological characters as part of the stories which encode the knowledge system. Small carved owls range from a quarter of an inch to just over an inch tall and are mostly found at Poverty Point, but not in residences (Gibson 2001, pp. 149-50). Studying the owls at Poverty Point led me to conclude, tentatively, that they represent the Barred Owl (*Strix varia*) due to the stance, smooth head, masked face and the distinctive ring around the neck. Barred owls have a very distinctive call, consequently are often referred to as 'hoot owls'. Further discussion would become highly speculative given the lack of the oral component to the tradition. Other animals, human and animal-human forms are also represented in small polished hard-stone objects and carved on soapstone vessels, plummets, banner stones and gorgets (Gibson 2001, pp. 187-8), as is to be expected of characters which feature in oral tradition. Human forms were also made of loess, as shown in Figure 10.10.

Figure 10.10 Baked loess figurines at the Poverty Point Visitors' Center. Photographs: Lynne Kelly.

Poverty Point Objects (PPOs)

Baked clay objects have been recorded from mound building sites over thousands of years. Small fired geometric objects and blocks, the most common being blocks of approximately 5.5 x 4.5 x 3.5 cm, have been found at Watson Brake; their purpose is unknown (Saunders 2010, pp. 70-1). But it is at Poverty Point where clay objects dominate the archaeological record.

Poverty Point objects, often referred to as PPOs, are used as a major diagnostic of the Poverty Point culture (Webb 1982, p. 70). Estimates range from 3 to 11 million as the number manufactured at Poverty Point over the span of the prehistoric occupation (Connolly 1998). They are usually referred to as 'cooking balls'. It will be argued here that the assumption that Poverty Point objects were primarily cooking objects appears to be misplaced, and may well have blinded researchers in the past to the central purpose of the Poverty Point monuments.

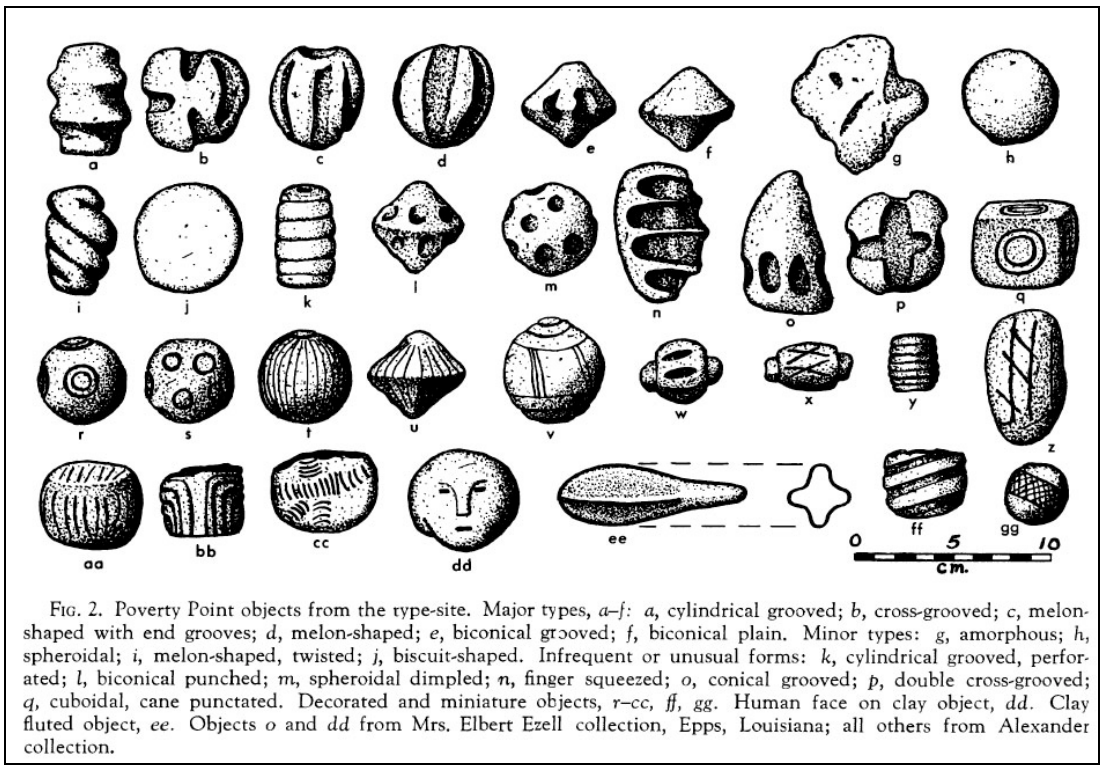

FIG. 2. Poverty Point objects from the type-site. Major types, *a–f*: *a*, cylindrical grooved; *b*, cross-grooved; *c*, melon-shaped with end grooves; *d*, melon-shaped; *e*, biconical grooved; *f*, biconical plain. Minor types: *g*, amorphous; *h*, spheroidal; *i*, melon-shaped, twisted; *j*, biscuit-shaped. Infrequent or unusual forms: *k*, cylindrical grooved, perforated; *l*, biconical punched; *m*, spheroidal dimpled; *n*, finger squeezed; *o*, conical grooved; *p*, double cross-grooved; *q*, cuboidal, cane punctated. Decorated and miniature objects, *r–cc*, *ff*, *gg*. Human face on clay object, *dd*. Clay fluted object, *ee*. Objects *o* and *dd* from Mrs. Elbert Ezell collection, Epps, Louisiana; all others from Alexander collection.

Figure 10.11 Poverty Point objects (PPOs) from the type-site, as presented in Webb (1968, p. 304). Permission sought.

Lumps of loess were hand-shaped into balls used to heat their cooking pits. Referred to as Poverty Point objects, they came in a variety of shapes: bicones, grooved bicones, grooved cylinders, cross-grooved melons, longitudinally-grooved melons, end-grooved melons, spheroids, and dozens of less common forms. Shapes helped regulate pit temperature and cooking time. Decorated and miniature balls probably were used for other things. I do not believe they were attempts at writing or taking inventory, but I have no doubt they were ideographic on some level (Gibson 2001, p. 268).

Figure 10.12 Miniature Poverty Point objects (PPOs) as displayed in the Poverty Point Visitors' Center.

Evidence from finger imprints indicate that women and children made some of the balls, which is then used to argue that PPOs were domestic cooking items (Webb 1982, p. 40). The data quoted show that finger and hand squeezed objects number only 60 objects at Poverty Point, out of 17,923 (0.33%) and 0.02% at Claiborne (Webb 1982, p. 39). This in no way indicates that women and children made all the PPOs, nor that the purpose of the balls was therefore domestic. Given that this thesis argues that PPOs were used as part of the training to the knowledge system, it is to be expected that at least a proportion would be made by children and/or women.

Pierce argues that PPOs were primarily used to heat ovens for cooking (1998, p. 164) noting that they are found in middens, hearths and pits. As baked objects, they need to be fired, whether used for cooking or not. Pierce writes that 'different kinds of Poverty Point objects were used as heating elements under similar conditions…' yet notes that the 'wide variety of shapes appear to have no impact on performance' (Pierce 1998, p. 178). As further support for his argument that PPOs were cooking balls, Pierce refers to Clark and Barbetti's (1982) study of clay cooking objects in the Wilandra Lakes region of New South Wales, Australia, which he refers to as 'similar clay objects' (1998 p. 166). However in Clark and Barbetti's study, the clay objects are entirely associated with hearths, and no mention is noted

of presence in middens or any decoration or shaping. Consequently the study supports Pierce's concept that clay objects of this size can, at times, be used as cooking stones, but the archaeological context is so different that little more can be drawn from this comparison.

Gibson notes that three of the common shapes of PPOs, when transferred to earth ovens, cooked food well, but also notes that 'plain old dirt clods or gravel would have done that. So, why make shaped forms?' (2001, p. 114). He describes experiments which suggest that objects of different shape produce different heating and cooling results in pits.

> Admittedly, these were field tests often conducted while libations flowed and good times rolled, lacking some of the rigorous of controls of laboratory experiments. But Poverty Point chefs did not cook in a lab, either (Gibson 2001, p. 116).

Gibson's discussion implies that experiments were not repeated to establish experimental consistency, nor did he take into account ambient temperature (2001 pp. 114-6). No experiments were conducted with the more elaborately decorated forms (Pierce 1998, p. 164). Consequently, this experimental data can be neither accepted nor dismissed in terms of exploring the purpose of decorating PPOs.

Mulberry shaped PPOs, thought to be from the coastal site of Claiborne, were found in small numbers at Poverty Point (Gibson 2001, pp. 172, 263-4; Webb 1982, p. 67). Station archaeologist at Poverty Point, Dr Diana Greenlee writes that 'if it turns out that our mulberries are from Claiborne, then we've got movement of some PPOs between distant sites and that would be consistent with a function other than just cooking' (2010, pers. comm., [email] 8 January).

Gibson notes that 'cooking balls' were relatively infrequent at a nearby encampment described as 'bereft of ideographic or ornamental objects' (2001, p. 235) and that they were also scarce at encampments where there were no mounds (Gibson 2001, pp. 235-8). Why would they stop using PPOs as cooking balls away from the monumental site if they were so effective?

As a result of as yet unpublished data, archaeologist Robert Connolly writes that

> There is no question on the issue of PPOs being other than cooking – everything from the dice shaped with punctates, the etched pillow shape and so forth. I can take select cylindrical grooved PPOs and line them up on a counter by form and have them transition from the classic shape to mushrooms or phallics - clearly well beyond any cooking anything (2012, pers. comm., [email] 10 February).

Of the 29,000 classified objects in Webb's major study of PPOs, 86% of the objects fell into six major types (Webb 1982, p. 37). A set of six clearly identifiable types offers 720 permutations when the PPOs are laid out in various arrangements on the ground. Each arrangement could then be used as mnemonic to specific verses, much as with the Yoruba divination system discussed in Chapter Three[22]. Among many other aspects of Yoruba life, the verses include detailed descriptions of how to navigate the Benue River, its obstacles, rapids and seasonal variations (McClelland 1982, p. 71)—the sort of information which must have also been encoded in the knowledge system of the Poverty Point people who navigated the Mississippi and its maze of tributaries.

Figure 10.13 A set of six mini-PPOs at the Poverty Point laboratory. Photograph: Lynne Kelly.

[22] The number of permutations is calculated using the formula n! where n is the number of objects (in this case 6). Hence n! = 6 x 5 x 4 x 3 x 2 x 1 = 720. This assumes that there are no repetitions and all six are used for every possible 'toss'. Should combinations of specific shapes be allowed, then more possible outcomes arise. A full mathematical analysis is considered beyond the scope of this thesis, but could be undertaken using more detailed information on contexts and relative numbers for each shape.

The suggestion, in the face of limited data, is that six basic shapes were used to create mnemonic combinations. It is logical that more common shapes were used in smaller combinations for public or lower levels of initiation, while the full six would be used for higher levels. The rarer shapes would be used for the highest levels of initiation involving more information learned by the very few of the most elite knowledge keepers. As PPOs can be readily made on location whenever a set is needed, they are a technology which requires no transport other than the understanding carried in memory. Hence they will not be curated nor carried as much as created for use, and dropped when no longer needed. Secrecy is retained in knowledge of the verses, not the objects themselves.

It is suggested here that, although the Poverty Point Objects may well have served as cooking balls, a significant proportion also served as mnemonic aids to the knowledge system.

10. An imbalance in trade

Poverty Point received clearly identifiable imported stone from far afield. What was exchanged for the stone, however, has not been identified in the archaeological record. This chapter argues that information was traded at Poverty Point. Gibson describes the amount of stone delivered to Poverty Point as ‘staggering’ (2001, p. 174) having been sourced from as far as 2,400 kilometres away (Gibson 2001, p. 268).

> Nothing of identifiably Poverty Point cultural origin reached distant sources of exchange materials, and very little of tangible nature passed along trade routes very far from Poverty Point itself. The lack of reciprocal trade material was what prompted ideas about direct acquisition or about soft goods, either perishable or ideological, being exchanged for hardware. Those ideas never appealed to me. Exchange connections that stretched as far as Poverty Point’s would not have involved food, not even preserved stores; distances were simply too great to have created any profit in or dependence on exchange goods. Besides, practically the same foods could have been gotten fresh from home woods and waters with less effort.… To me, long-distance exchange had to provide direct and dependable material benefits to all who participated; otherwise it would not have operated so well, for so long, or over such long distances (Gibson 2001, p. 176).

A reliable knowledge system aids ‘direct and dependable material benefits’ for all members of the culture. The maintenance and transmission of knowledge is an integral component of oral cultures.

Conclusion

Although some of the ten indicators cannot be shown at Poverty Point, it is evident from the complexity and sheer number of the portable artefacts, that a complex hunter-gatherer culture was responsible for the site. The massive earthworks demonstrate that hunter-gatherers attained levels of organisation and complexity which have previously only been attributed to advanced sedentary farming cultures. It has been shown that a significant proportion of the ubiquitous Poverty Point objects could be considered as a mnemonic technology, which accounts for their many forms and sizes. If that is the case, then it is strongly indicated that a knowledge elite at Poverty Point maintained their power through the control of information.

There is a great deal still to be recorded in the archaeology of Poverty Point, but it is clear that including the role of the knowledge system and associated mnemonic technologies will add much to the analysis of this complex and enigmatic site.

Chapter 11 - Stonehenge in the British and Irish Neolithic context

Introduction

On visiting the Neolithic landscapes including Stonehenge, Durrington Walls, and Avebury in Wiltshire, and stone circles in Cornwall, the Ness of Brodgar monuments on Mainland, Orkney, and finally Newgrange and associated monuments in the Boyne Valley, County Meath, Ireland, I was struck by the individual implementation of common themes. Given the ubiquitous and fundamental role knowledge systems play in most, if not all, documented oral cultures, it is not surprising to find that the lens of primary orality offers a radical new interpretation of the monuments built by a culture which had no contact with writing. As Bradley writes of mobile cultures: ‘a world in which natural places could take on a special significance – monuments would have little part to play’ (1998, p. 34). On settlement, however, when the travelled landscape could no longer provide a sequence of sacred locations, it would become essential that structures be created as knowledge spaces to help maintain the knowledge on which their survival depended. Specifically, it will be argued that the Stonehenge / Durrington Walls complex of monuments were designed, implemented and constantly changed to suit the needs of the knowledge elite.

Archaeologist Julian Thomas (1998, p. 154) describes the British Neolithic landscapes as becoming ‘information spaces’ in ways they had not been before, arguing that monuments represented a new ‘technology of meaning’ that were clearly connected with memory. This chapter will explain exactly how. The remains of monumental structures from the British Neolithic landscape have been the subject of serious debate for hundreds of years. There is probably no site in the world which has been the subject of more theories than that of Stonehenge. The argument here addresses not how the monument was built, but why. For hundreds of years, it was a circle of stones taking a similar form, if not material, to a thousand other stone circles. It was only later that the massive sarsens arrived, leading to the image of Stonehenge which is so familiar today. This chapter will argue that any theory for Stonehenge must be consistent with the evidence for the other stone circles, large and small, from the Neolithic era.

Why Stonehenge?

The British and Irish Neolithic was a world of stone circles. For a population which is no longer moving around the broader landscape, yet does not yet have the large buildings or streetscapes so popular with the Greek orators, a stone circle is a simple, effective way to

form a set of memory loci for an annual cycle. The Neolithic landscape is a place where restrictive passage monuments contrast with public ceremonial spaces, and where enigmatic decorated objects show a skewed distribution to henge sites. A study of all the Neolithic sites is, regretfully, well beyond the scope of a thesis which aims to paint a broad picture as a starting point for detailed analysis. This thesis is best served by assessing one site while setting it firmly within the broader Neolithic context.

Stonehenge has been chosen as it was there that the archaeology so clearly addresses the theme of transition in the changes to the monument over the 1500 years or so of use. As will be explained below, Stonehenge is now considered part of a complex of monuments, which includes the nearby Durrington Walls and Woodhenge sites. The Stonehenge landscape reflects the changes in socio-political structures from those which were generalised in Part One of this thesis for mobile hunter-gatherer cultures, such as the Australian Yolngu, to sedentary, small-scale agricultural cultures such as the Pueblo. Specific beliefs and rituals, of course, cannot be implied from any other culture.

Stonehenge attracts an extraordinary range of new theories, many of which pay scant attention to the actual archaeology. It was with great appreciation that I spent many hours in June 2010 with Dr Rosamund Cleal, Curator at the Alexander Keiller Museum, Avebury and co-editor of the definitive work, *Stonehenge in its landscape* (Cleal et al. 1995). Dr Cleal concluded our sessions with permission to quote her as saying: 'This theory is well worth pursuing'. This chapter is the result of accepting that challenge, acknowledging that there is a great deal more work to be done.

A brief overview of British and Irish Neolithic archaeology

Around the start of the Neolithic period, there is evidence of possible year round occupation of favourable sites, increased social complexity, and the adoption of domesticates along with a continued dependence on wild foods (Bradley 2007, pp. 27-30; Thomas 1999, p. 222). Lithic analysis indicates that there was a relatively high degree of mobility among Neolithic Britons, possibly based on seasonal access to resources (Thomas 1999, p. 29). The importance of individual burial seems to have increased as the process of monument building intensified and reached its limits (Bradley 2007, p. 89).

A chronology of monumental forms through the British Neolithic into the Bronze Age is beyond the scope of this thesis[23]. An overview of the monumental forms, in a very approximate order of their appearance in the landscape, is given so the archaeology of Stonehenge can be seen within the broader context in which it was built.

[23] For more detail, see Richards, 1996, p. 195; Thomas 1996, p. 131; Chippindale 2004, p. 210; Johnson 2008, p. 23; Bradley 2007, p. 50 among many others.

Causwayed enclosures

Archaeologist and illustrator, Ian Dennis, developed the following drawing of a causewayed enclosure, an early Neolithic monument which generally predated the henges. Prepared for Whittle, Healy & Bayliss (2011) from Curwen (1934; 1936), Dennis used site plans and photos of the hill to get the scale and the layout correct (2011, pers. comm. [email] 24 June). The drawing shows many of the features appropriate for a knowledge space with the circles of posts on the outer and inner banks providing a sequenced set of memory loci for the annual cycle, with further posts aiding memory of specific ceremonies. The various circles would be the simplest way of indicating levels of initiation, the centre being the most restricted site. Domestication, such as is indicated by the presence of animal remains and a hearth, is entirely consistent with the integration of the sacred and profane in oral cultures.

Figure 11.1. Whitehawk Neolithic causewayed enclosure, Brighton. Drawing © Ian Dennis, Cardiff University, Wales, UK. Reproduced with permission.

Passage 'graves' and chambered 'tombs'

Various names are given to the early Neolithic monumental structures which varied greatly in size and form, but usually involved massive mounds of earth, often containing megalithic chambers and passages. Most of the names include the words 'grave' or 'tomb' therefore establishing the primacy of funerary practices. Fleming (1973, p. 178) considers the long held rigid view that these monuments function solely as burial chambers to be a bar to understanding their role. In fact, many authors have questioned whether burial was the

primary function[24]. Numerous barrows and other monuments in Britain had the inhumations or cremations inserted some time after the initial construction (Thomas 1999, p. 47) while many long mounds contained no human remains at all (Barrett 1994, p. 54; Thomas 1999, p. 139 207; Cummings 2008, p. 138; Bender 1992, p. 748). The largest mound, Silbury Hill, has no sign of a burial (Thomas 1999, p. 217). In fact, Barrett argues that we 'must now recognize that funerary and ancestral rites need only have been one part of a broad spectrum of activities which contributed towards this programme of monument building' (1994, p. 54).

Insoll writes that 'the focus of archaeological study on funerary remains is in part a reflection of the survival of evidence' (2004, p. 66). Knowledge systems are much harder to dig up. That the long barrows and passage graves usually served as burial places is not in dispute, but considering them primarily as tombs masks interpretation which accounts for far more of the features documented in archaeological reports than would be warranted for funerary rites. Having visited a broad range of passage monuments in England, Scotland and Ireland, it was clear that the needs of a restrictive knowledge elite, those who most likely were then interred there, would be well served by these structures. They enabled elite groups to meet in secrecy within the chambers and to conduct public ceremonies outside. Some will have served a major centre, such as the immense Boyne River complex in County Meath, Ireland[25]. Others will have served a smaller local community such as Cairn-T at Loughcrew, also in County Meath in Ireland.

[24] See for example Barrett 1994, p. 56; Bradley 1998, pp. 51-67; Brophy 2005, p. 9; 2007, p. 49; Fleming 1973, p. 178; Noble 2005, p. 33; Thompson 2004; Tilley 1994, p.154.

[25] A great deal has been written about the monuments in the Boyne Valley, much of which does not stand up to academic scrutiny. References consulted for this thesis include O'Kelly 1982; Thomas 1990; Brennan 1994; Ruggles 1999; Cooney 2000; Bradley 2007; Stout & Stout 2008.

Figure 11.2 Knowth passage cairn in County Meath, Ireland, showing the inscribed rocks which form a sequence around the perimeter. Photograph: Lynne Kelly.

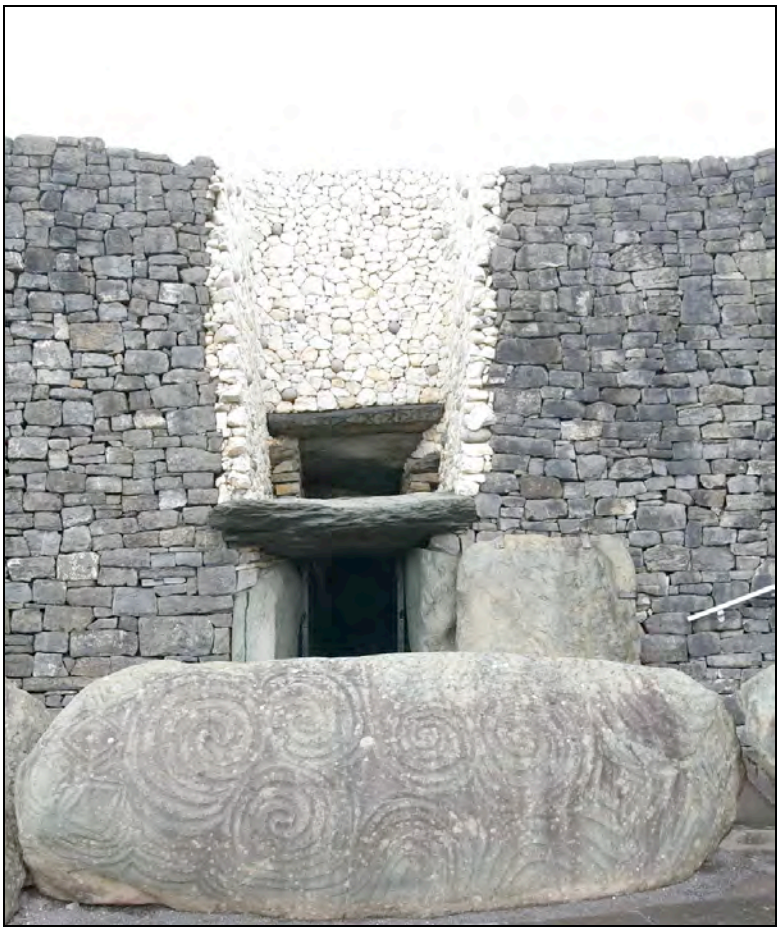

Figure 11.3 The restrictive entrance to the massive Newgrange Tumulus, as reconstructed, County Meath. The top window serves to admit the sun on the winter solstice. Photograph: Lynne Kelly.

Figure 11.4 Cairn-T, one of many small cairns, County Meath. The entrance is toward the left of the image. Photograph: Lynne Kelly.

Figure 11.5 Rock art in the narrow passage of Cairn-T, County Meath, Ireland. Photograph: Lynne Kelly.

These monuments are often part of a complex of monumental forms, although it cannot be assumed all aspects were used contemporaneously. Rock art can be seen at many such sites. Solar alignments are found in some monuments, such as alignments with the winter solstice (as at Newgrange) and autumn equinox (as at Cairn-T). The autumn equinox would provide ample warning of the time until the major gatherings at winter solstice to

notify people to prepare to travel.

Figure 11.6 At Cairn-T, the rising sun on the mornings around the equinox illuminates the passage and chamber, 22 September 2011. Photograph courtesy Michael Fox, Newgrange.com. Reproduced with permission.

Many of the chambered cairn sites also incorporated stone, pit and timber circles, such as the stone circle and pit circle at Newgrange (Stout & Stout 2008, pp. 84-91), and the small post circle at Knowth (Cooney 2000, p. 165). The modern look of the reconstruction of the exterior wall of Newgrange is considered by many to be inappropriate (Stout & Stout 2008, pp. 1-6), but that does not detract from the dichotomy of public and restricted spaces, the encircling decorated kerbstones (Stout & Stout 2008, pp. 20-27) and the highly restricted passage and chamber aligned on the winter solstice. A detailed analysis of the Boyne Valley monuments is beyond the scope of this thesis, but reading indicates that they have much to offer in support of the argument put forward here.

Figure 11.7 The controversial reconstructed wall at Newgrange incorporating stones from distant sources brought to the site during the Neolithic. Photograph: Lynne Kelly.

Circles of stone and wood

As was discussed in Chapter Eight, a circle of posts or stones is the simplest way to achieve a set of sequenced locations with which to implement the Method of Loci over an annual cycle. This implementation will suffice during the transitional phase when the landscape is no longer travelled by a mobile culture, but built spaces are not available. As this is such a simple yet effective technology, it is not surprising that it was implemented in many variations across a vast area.

In Britain and Ireland more than 1000 stone circles have been found (Burl 2007, p. 27). Many were part of a more complex structure, with timber and stone circles, multiple stone circles or concentric timber circles; some have ditches with banks, some just ditches, some with no earthworks at all; some are associated with tombs, some of which are decorated; most are associated with decorated pottery and other portable engraved objects, and all show similarities with other monuments within Britain and abroad (Bradley 2007, pp. 88-177; Brophy 2005, p. 9; Cummings 2008, p. 149).

Henge monuments are defined as circular spaces formed by a bank and ditch. A few are very large, such as Durrington Walls at 400 metres in diameter (Parker Pearson 2007a, p. 140) with some as small as five metres across (Darvill 2006, p. 106). The henges, like causewayed enclosures, appear to have been ceremonial monuments rather than permanently occupied sites (Thomas 1999, p. 60).

At the massive Avebury Henge[26], 24 kilometres from Stonehenge, 11.5 hectares are

[26] Material on Avebury is prolific, much of which does not stand up to academic scrutiny. Details of the Avebury landscape monuments used for this thesis included Barrett 1994; Thomas 1999; Pitts 2001; Watson 2001a; Burl 2002; Gillings et al. 2008 and Pollard & Reynolds 2010.

enclosed by the earthworks, the ditch having been dug 10 metres into the chalk with a bank, at its eroded height, reaching 4 metres (Barrett 1994, p. 9).

Figure 11.8 Part of Avebury stone circle and ditch. Photograph: Lynne Kelly.

Walking the Avenue, each stone comes rhythmically into close perspective, the spacing being perfect for reference to only one standing stone at a time. As noted in Chapter Two, Warlpiri advisor, Nungarrayi, has explained that bodily movement acts as a strong mnemonic when chanting the knowledge associated with Country.

Figure 11.9 Avebury Avenue. Photograph: Lynne Kelly.

Restricted and public dichotomy is evident at Avebury, with megalithic structures within the henge, as well as the chambered cairn, West Kennet Long Barrow, and Silbury Hill only a short walk from Avebury.

Figure 11.10 West Kennet Long Barrow, forecourt. Photograph: Lynne Kelly.

Figure 11.11 West Kennet Long Barrow, passage. Photograph: Lynne Kelly.

Barrett (1994, pp. 30-31) writes that Silbury Hill, the largest artificial prehistoric mound in Europe, is a little over 1 km to the south of Avebury. It rises to a height of 40 metres, covering 2.1 hectares and took an estimated 3 million hours of labour to construct the complex sequence of stages to the final platform, which was 30.5 m in diameter. With no central deposits and no burials found, Barrett suggests that '[p]erhaps the simplest thing to do is accept Silbury Hill for what it is, an elevated platform' (1994, p. 31). Like the mounds in the American southeast, elevated platforms would enable elite performances in a restricted space.

Figure 11.12 Silbury Hill. Photograph: Lynne Kelly.

A complex of Neolithic monuments can be found in the Ness of Brodgar, Orkney[27], displaying many of the most typical forms within a single landscape: a massive henge monument with standing stones, the Ring of Brodgar, smaller arrangements of standing stones, the Stones of Stenness, a large passage cairn, Maeshowe, and much smaller passage cairns close by, such as Unstan.

[27] References consulted for the Orkney monuments include Card 2007; in press; Cummings 2005; McKie 1997; Richards 1996; 2000; Ruggles 2000; Wickham-Jones 2006.

Figure 11.13 Ring of Brodgar, Mainland, Orkney. Photograph: Lynne Kelly.

Images from recent excavations at the Ness of Brodgar, provided by Nick Card, Senior Projects Manager, Orkney Research Centre for Archaeology, showed numerous decorated objects and structural stones. A great deal of enigmatic incised and even painted material is currently being excavated (Card & Thomas, in press).

Figure 11.14 A 20 cm section of an incised decorated slab from one of the Neolithic buildings currently being excavated on the Ness of Brodgar. © Orkney Research Centre for Archaeology. Reprinted with permission.

The importance of the ditches

Why would Neolithic people put so much effort into cutting deep ditches into stone when they had only antler picks as tools? Why did Neolithic henges, such as Stonehenge, have flat-bottomed ditches, and why were they segmented (Bradley 2000, p. 150; Burl 2002, p. 70; Cleal et al. 1995, pp. 63-114)? Structured deposits within the bank, such as at Avebury, indicate that the ditches were not merely a quarry for the bank material (Thomas 1999, p. 202). Any theory for the purpose of henge monuments must address these issues.

In an oral culture there is an imperative to perform the ceremonies and repeat the knowledge. Unlike the Chacoans in New Mexico, the Neolithic Britons could not assume fine weather. A ditch would enable participants to get out of the wind, and to cover a portion of the ditch to protect from the rain. Flat bottoms allow the dances and songs to be performed. Ditches which appear to be used purely as markers, such as the ditches along the Stonehenge Avenue, are roughly cut with either V-shaped or rounded bottoms (Cleal et al. 1995, pp. 303-6).

Archaeologists argue that the most important ceremonies were midwinter (Parker Pearson et al. 2006, p. 234) when days are short and light is low. The sides of the ditches, especially in the white chalklands of Wessex, would reflect light from torches, thus increasing visibility of dancers. It would have been a spectacular sight. But just as important, it would have been an intense sound. Songs performed in the middle of the larger henges would have been inaudible to anyone on the bank. Ceremonies performed in the ditch segments would not only have been audible, but the sound would have been enhanced, as described below. It is argued here that the entire ditch would not have been used for any given ceremony.

Ceremonies would have moved around the circle over the cycle, the ditch deposits referencing the rituals being performed. Consequently, ditches would have been dug and maintained as needed, depending on the size and importance of the ceremony. Stonehenge's ditch and bank were cut in approximately 60 segments, of varying lengths and widths, forming an approximate circle, 110 m in diameter. The bottom was mostly flat, showing signs of trampling in a number of segments, with the importance of the floor of the ditch evident from soon after the ditch was first constructed (Cleal et al. 1995, p. 117). The width varied between 2 and almost 5 m with steep sides varying in depth from 1.4 m to over 2 m (Johnson 2008, p. 94). The bank was 6 metres wide at the base and estimated to have been about 2 m high, highly visible in dazzling white chalk, with the bank segments matching the irregularity of ditch segments (Johnson 2008, p. 100).

Some lengths of the ditch were deliberately back filled soon after digging, some allowed to silt naturally over time, while others were repeatedly recut and maintained

(Bradley 2007, p. 81; Cleal et al. 1995, pp. 63-114; Parker Pearson et al. 2009, pp. 29-31; Pollard & Ruggles 2001, p. 77). This would reflect the degree of relevance of the ceremonies, some of which would have lost their significance over time while others remained relevant as the social structure changed during this time of transition. Segment 18, for example, is noted as 'particularly flat and wide' (Cleal et al. 1995, p. 88) which would suit a ceremony which featured large numbers and dancing, while the 'craters' (Cleal et al. 1995, p. 65) with their unique deposits and greater depth, were probably related to more sacred events in the annual calendar.

More spectacular were the ditches of the massive henges sites. Parker Pearson describes the ditch at Durrington Walls as having 'the appearance in plan of a partially merged string of sausages, with each … being on average 40 m long, up to 10 m wide and over 5 m deep' (2007a, p. 140). Avebury's ditch was 'dug 11m down through hard, rocky chalk' (Pitts 2001, p. 182). The excavator of Avebury's ditch, Harold St George Gray, commented on the extreme care the builders had taken to ensure perfectly flat floors and smooth walls (Burl 2002, p. 70).

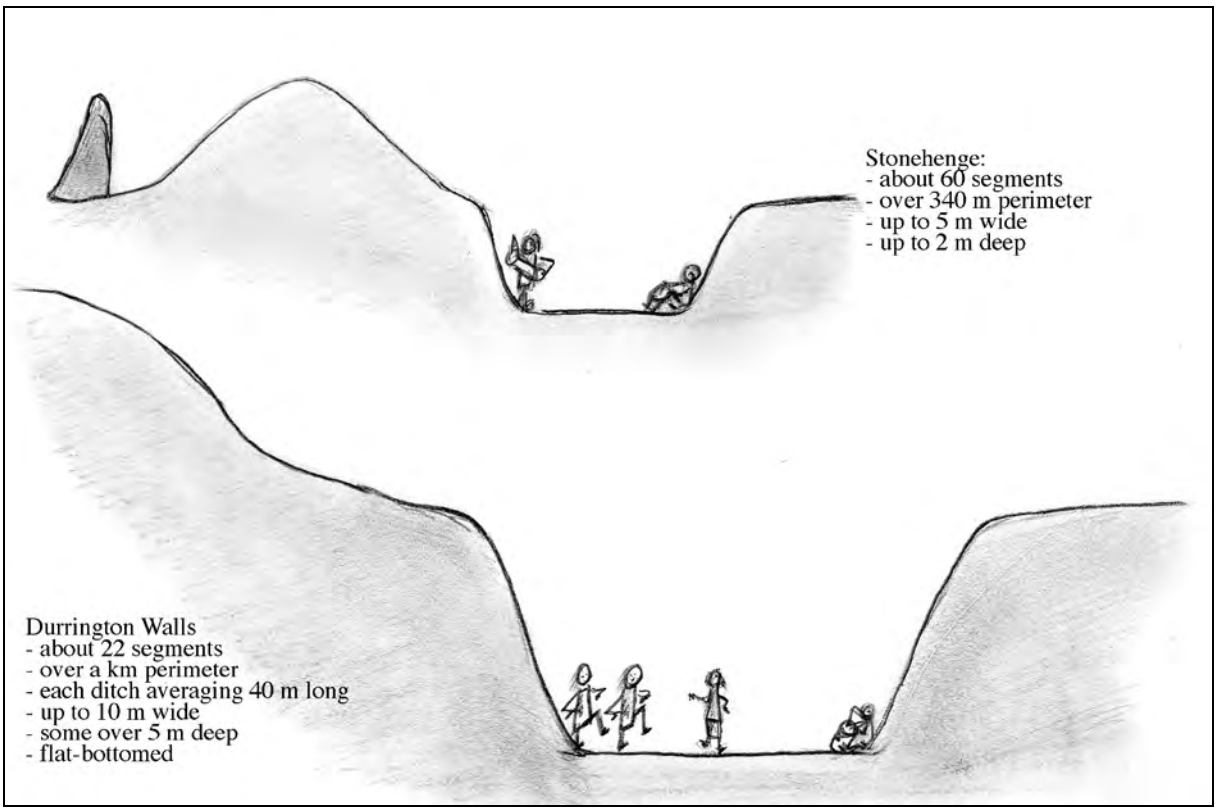

Figure 11.15 A comparison of the ditch profiles of Stonehenge and Durrington Walls. People have been added to enable assessment of these ditches as performance loci. Image: Lynne Kelly.

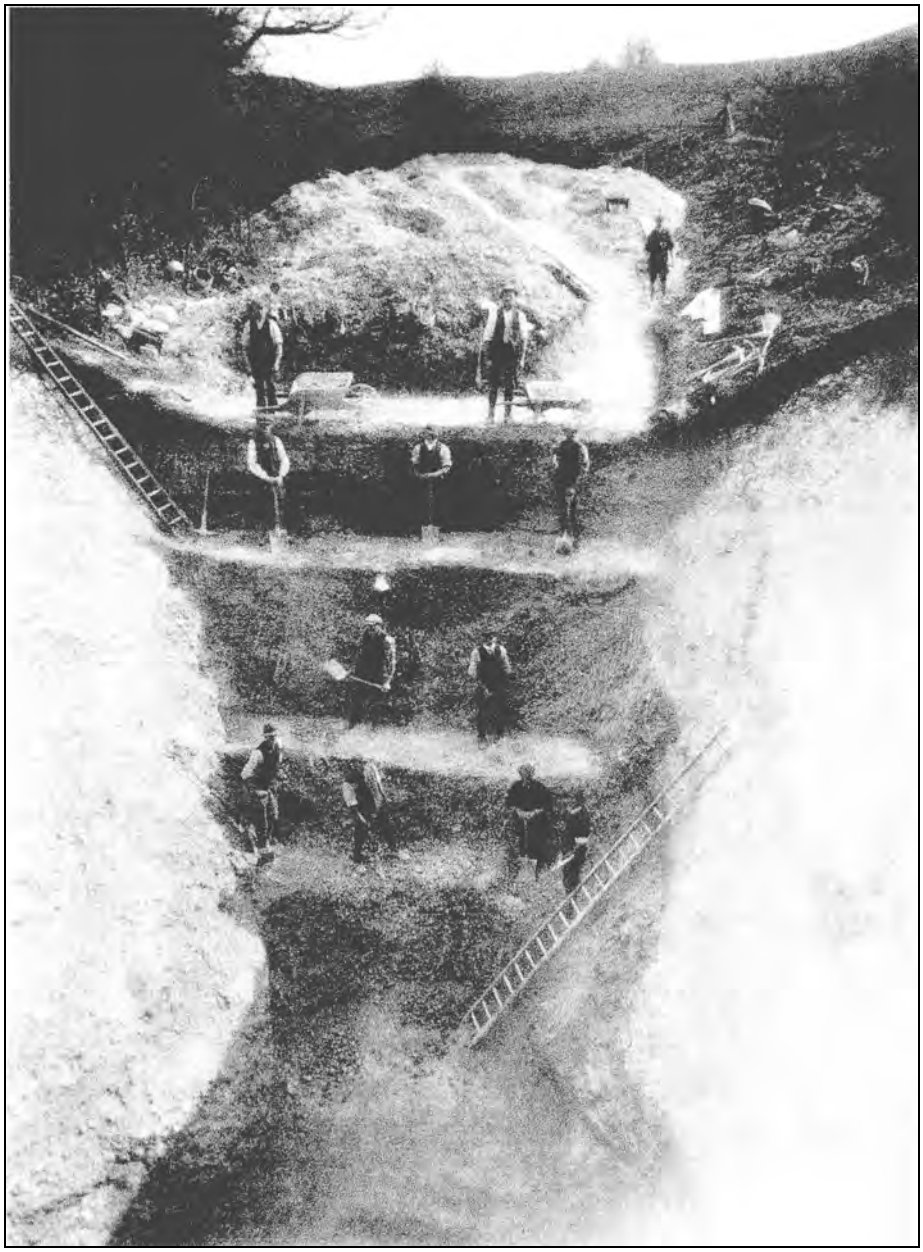

Figure 11.16 A photograph from Gray's 1922 excavation of the Avebury ditch, indicating the depth, which was comparable to that of the ditch at Durrington Walls.

This argument, however, implies that the ditches must have been dry. Although the ditches in Wessex were not filled with water (Burl 2002, p. 73), some writers claim that the ditches in Orkney may have been waterlogged for much of the year (Richards 1996, p. 205; Cummings 2008, p. 151). Dr Alison Sheridan, Head of Early Prehistory in the National Museums of Scotland Archaeology Department, when discussing the ditch of the Ring of Brodgar, Orkney, said that 'there is debate about whether the ditch was, or could be, waterlogged' [2010, pers. comm., 13 July]. Recent reports (Towrie 2011) indicate that the water level in Stenness Loch may have been up to a metre lower than today, which would make it unlikely, from my observations at the site, that the ditch around the elevated Ring could have been waterlogged.

The following table gives a summary of some of the ditch profiles for the largest of the Neolithic henges and for Iron Age structures. This research has not been exhaustive, and hence can only be taken as indicative. Further investigations will be made with future research.

Monument	Ditch type	Ditch profile
Stonehenge	Neolithic henge	Flat-bottomed
	Neolithic avenue	Roughly cut, round or V-shaped
Durrington Walls	Neolithic henge	Flat-bottomed, non-defensive ditch
	Neolithic avenue	1 metre wide 'gully'
Woodhenge	Neolithic henge	Flat-bottomed, non-defensive ditch
Avebury	Neolithic henge	Flat-bottomed, non-defensive ditch
Ring of Brodgar	Neolithic henge	Flat-bottomed, non-defensive ditch
Stanton Drew	Neolithic henge	Not excavated
Danebury (type site)	Iron Age hillfort	V-shaped defensive ditch
Old Sarum	Iron Age hillfort	V-shaped defensive ditch

This brief overview reinforces Bradley's observation that earthworks were converted from flat-bottomed to V-profile ditches when constructing the Iron Age hillforts (2000, p. 150).

The stages of the Stonehenge complex of monuments

The early inhabitants of Salisbury Plain are thought to have been primarily a mobile culture, trading within Britain and across to the Continent (Bradley 2007; Sherratt 1996). By the arrival of the sarsens at Stonehenge, the trend towards a settled community more reliant on farming and permanent pastures can be seen clearly in the archaeology (Cleal et al. 1995, p. 484). Michael Allen (1997) uses environmental evidence to argue that a gradual process of economic intensification escalated abruptly at the point when the stone settings at Stonehenge were constructed. Descriptions of the stages, dates and basic configurations are listed below, the headings and data taken directly from Parker Pearson et al. (2009, p. 26) with additional information as credited. Stages 1 to 8 replace Phases I, II and III as used in earlier literature.

Stage 1 - circle of bluestones, bank and ditch, timber posts, cremation burials – 3015-2935 cal BC.

The first phase of Stonehenge is a large circle of pits, known as the Aubrey holes, and a surrounding bank and ditch forming the earliest henge monument in the region (Thomas 2007, p. 155). There is a small outer and wide inner bank of earth broken by two entrances (Burl 2007, p. 12). Although it is often concluded that the Aubrey holes originally held posts

(Johnson 2008, p. 108; Pitts 2001a among many), 'a strong case' has recently been made that the shape of the holes now indicates that they held the undressed bluestones from the Preseli Ranges in Wales which were later moved to the centre arrangements in following stages (Parker Pearson et al. 2009, p. 32). This would make Stonehenge one of the earliest known stone circles (Pitts 2008b). Whether posts or stones, the topology forms an ideal set of memory loci.

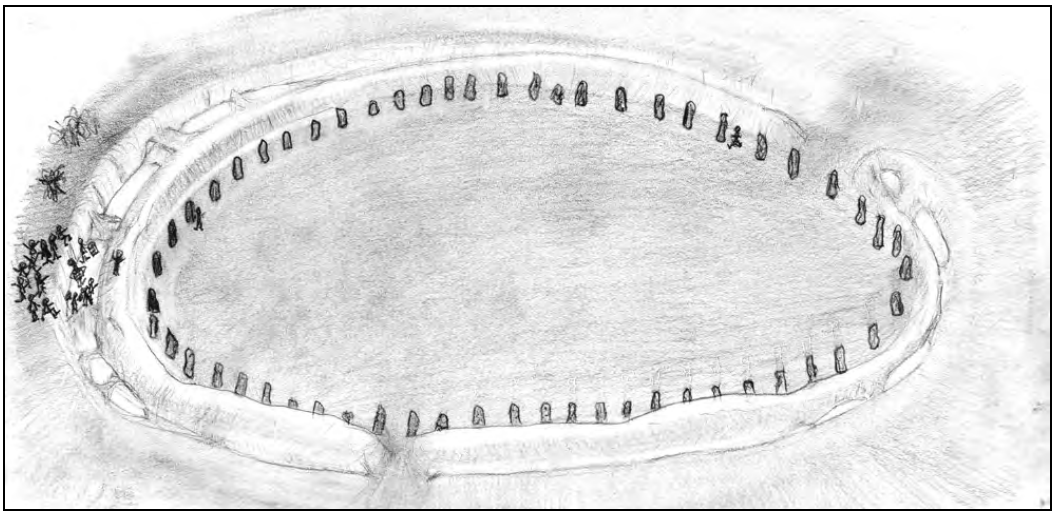

Figure 11.17 Impression of Stonehenge, Stage I, approximately to scale and with the bluestones forming the circle in the Aubrey holes. People have been added to show the scale of the monument in terms of its use for performance. Image: Lynne Kelly.

The term 'bluestones' is used as a general term to represent a variety of geologically similar rocks, mostly igneous (Cleal et al. 1995; Pitts 2001, pp. 136-7). During the fourth and third millennium BC, monuments built in the Preseli Hills included dolmens, long barrows, circles, enclosures and stone circles (Darvill 2006, p. 139). It is proposed here that the Stonehenge builders adopted the mnemonic technology used in Wales, or came from Wales themselves, and hence used Welsh stones. As the stone circle and its henge predate the familiar centre ring of sarsens by hundreds of years, the original purpose of Stonehenge may have to be sought in this initial stage. The circle of Aubrey holes shows no astronomical alignment (Johnson 2008, p. 106).

Stage 2 – Bluestones rearranged in an arc, with timber passageway, timber post arc and large house/hall on south side, cremation burials - 2900-2600 cal BC.

Stage 2 can be seen as a time of increased restrictiveness. Cleal et al. (1995, p. 115) describes this stage as 'a change of emphasis'. Activity at Stonehenge moved to the centre

with the addition of timber posts and a large palisade. There are signs of increased settlement in the area while the diet changed to be more agriculture-based. Grooved Ware pottery and chalk carved objects appeared, the importance of which will be discussed below. The emphasis on the ditch floor still continued in parts, while cremation and inhumation burials were placed in the ditch fill, on or just inside the bank and in the now empty Aubrey holes.

Importantly, as the bank and ditch performance space at Stonehenge was being lost, new henges were dug at Coneybury, 1 km to the southeast, along with the massive henge and settlement at Durrington Walls.

Stage 3 – Sarsen circle & trilithons, banked & ditched avenue, timber posts, Station Stones, Heel Stone, Slaughter Stones, bluestones rearranged, cremation burials - 2580-2470 cal BC

The truly unique aspect of Stonehenge is the ring of 30 upright sarsens topped with a carefully worked interlocking ring of lintels surrounding a horseshoe of 5 sarsen trilithons. These features are constructed of notoriously hard, silicified sandstone, believed to be from the Marlborough Downs, about 30 km north of Stonehenge (Johnson 2008, p. 127). There was a deliberate use of different sources of stone for the trilithons and very marked deliberate dressing distinguishing each of them (Tilley et al. 2007, p. 196). As would be expected for memory loci, individual stones had significance. The avenue was added along with other enigmatic stone and timber arrangements, the details being hard to distinguish from the archaeology due to later movements of the bluestones.

According to recent dating, it was over 500 years into Stonehenge's use that Durrington Walls, one of the largest of Britain's henge monuments, was built about 3 km to the north-east of Stonehenge, close to the Avon River (Parker Pearson et al. 2007, p. 628). At about 18 hectares in area and over 400 m in diameter, it is surrounded by a heaped bank and segmented ditch. There are approximately 22 segments averaging 40 metres long, up to 10 metres wide and over 5 metres deep (Parker Pearson 2007, p. 125) with one segment significantly wider than the others (Parker Pearson 2007, pp. 140-1).

Stage 4. Large pit in centre of Stonehenge, features and west side of stone circle, 'Stonehenge Archer' burial – 2450-2210 cal BC

There is evidence of the various arrangements of the bluestones in the centre before those now recorded, but the pits are poorly understood features (Pitts 2001). Nine burials have been identified in the area, including the 'Amesbury Archer' with associated high status grave goods and a European origin. All burials have radiocarbon dates which fall after the period in which the sarsens were erected (Parker Pearson et al. 2007b).

Stage 5. Bluestones re-arranged in central oval – 2270-2020 cal BC.

Stage 6. Bluestones re-arranged in central horseshoe – 2210-1740 cal BC.

The Bluestone oval was erected between the sarsen circle and the trilithons from bluestones almost all still in their natural state (Johnson 2008, pp. 156-8). Further bluestones were arranged in a central horseshoe. There were perhaps 60 or 70 stones in the oval and 19 in the horseshoe (Pitts 2001, p. 137). The full range of non-local stone types was employed in an outer oval of bluestones while the horseshoe consisted of spotted dolerite (Cleal et al. 1995, p. 15). Thus the various categories of Welsh rock were kept separated from one another even after regular moving over 500 years (Bradley 2000, p. 95).

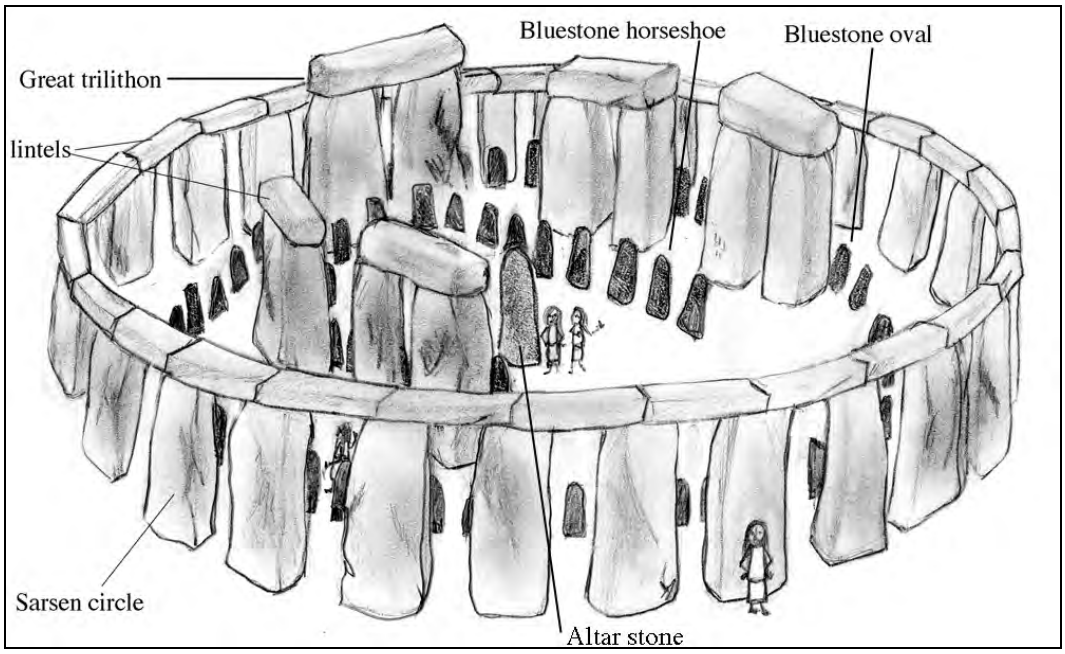

Figure 11.18 An impression of the space enclosed by the sarsen ring and trilithons. Drawn approximately to scale, people have been added to show how restricted the space would have been. Drawing: Lynne Kelly.

Figure 11.19 Stonehenge, October 2008. Two of the smaller bluestones can be seen, enclosed by the sarsen ring. In the foreground are the remains of the ditch, with the fallen Slaughter Stone and the edge of the entrance from the Avenue on the lower right. Photograph: Lynne Kelly.

Figure 11.20 Stonehenge, July 2010. One of smaller bluestones next to a sarsen from the trilithon horseshoe, for size comparison. Photograph: Lynne Kelly.

Stage 7 - Z Holes- 2020-1740 cal BC

Stage 8 – Y Holes – 1630-1520 cal BC

Two concentric circles of carefully shaped pits, referred to as the Y and Z Holes, were arranged around the sarsen circle. At about 1.7 x 1.2 m, tapering to a flat base, they were about 1 m deep (Cleal et al. 1995, p. 256). Rings of pits are known from many sites with excavated pit rings showing deposits such as carved chalk objects, Grooved Ware, animal bones, antlers, flints, and with human remains as secondary deposits (Bradley 2007, pp. 126-8).

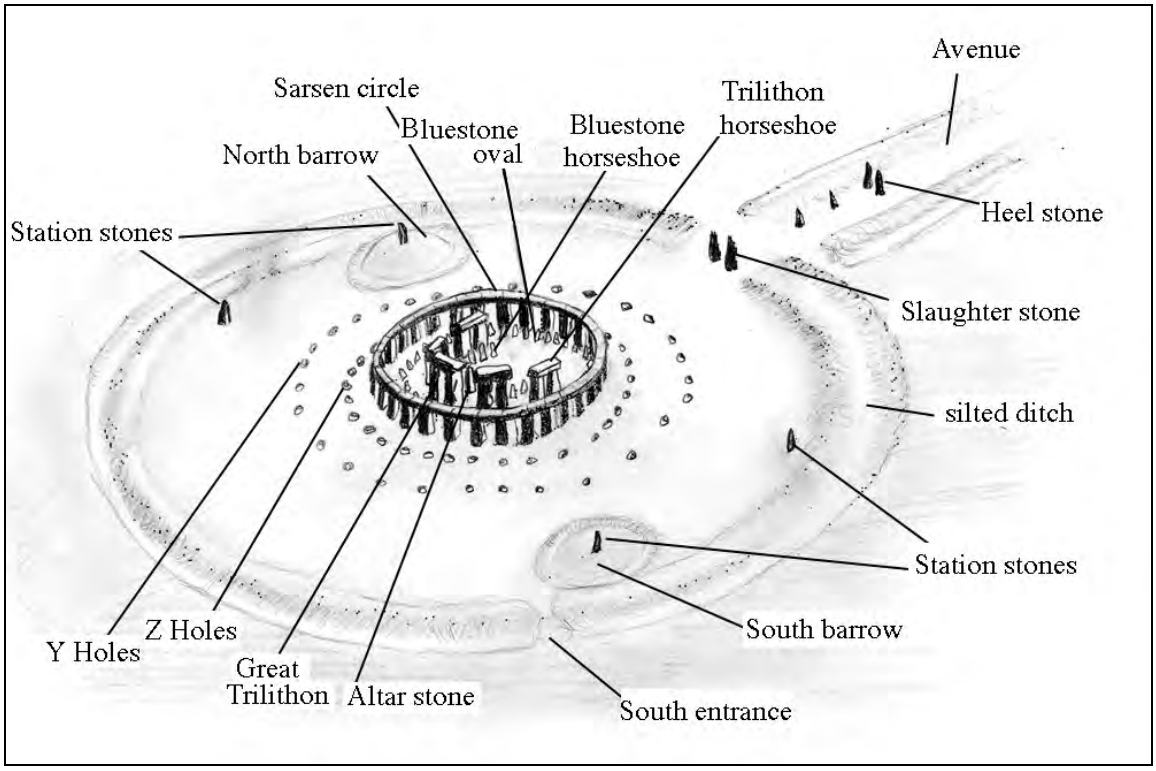

Figure 11.21 Stonehenge as it appeared in the final stages of use. Image: Lynne Kelly.

During the early second millennium BC most of the monuments in use during the previous 500 years, including Durrington Walls, were abandoned. Stonehenge was an exception (Darvill 1997, p. 193; Ruggles 1999, p. 138).

The Current Theories

No discussion will be offered here of theories relating to wizards, aliens, ley lines and other phenomena which have no basis in known science. Having spent many decades evaluating pseudoscientific claims (Kelly 2005), it is not considered that these theories warrant serious consideration. As the Druids came much later in prehistory (Pryor 2003, p. 424), they are also not discussed here.

Stonehenge as a cemetery

That Stonehenge was used for burials is not in dispute. Radiocarbon dating of cremated bones now indicates that Stonehenge was used for burial from very early in its history (Pitts 2008b; Parker Pearson 2009). The total number of individuals buried at Stonehenge has been estimated at 240 (Pitts 2001, p. 121). The vast majority of Britain's dead in the third millennium have left no trace (Parker Pearson et al. 2006, p. 243). Durrington Walls has proved to have surprisingly few human remains for a Neolithic ceremonial site (Parker Pearson 2007a, p. 133; Parker Pearson et al. 2009, p. 36). As a result of comparison with the megalithic stone monument constructions in Madagascar, Parker Pearson considers Stonehenge as belonging to the ancestors, the stone being in opposition to the timber circles at Durrington Walls signifying the realm of the living (Parker Pearson & Ramilsonina 1998a, 1998b; Parker Pearson et al. 2006). The dichotomy I see resonates with this. The sacred, immutable knowledge will have almost certainly been attributed to the ancestors – be they mythological or forebears. Wood, being readily carved, will have been more likely linked with the adaptable, public song-poetry performed for the masses. It would have been the most respected of the knowledge elite who would have been buried at Stonehenge.

The importance of individual burial seems to have increased such that by the end of the third millennium there was a significant shift to an emphasis on the status of the individual (Barrett 1994, p. 67; Bradley 2007, p. 89), as would be expected as a more restricted and powerful elite emerges with settlement.

As Barrett suggests, 'mortuary and ancestral rites need only have been one part of a broad spectrum of activities which contributed towards this programme of monument building' (1994, p. 54). The arguments presented in this chapter are thus compatible with the concept of Stonehenge as a cemetery, but sees that role as only part of the story.

Stonehenge as an Astronomical Observatory

Astronomical observations were without doubt part of the role of Stonehenge and the associated monuments. Low-precision astronomical alignments, found repeatedly among henges, stone and timber rings, indicate that astronomy was very much a part of the ceremonial tradition in late Neolithic (Ruggles 1999, p. 131).

The socio-political structure offered here is superficially similar to that of the 'astronomer-priests' proposed by British archaeologist, Euan MacKie (for example see 1977a; 1977b; 1997; 2009). However, McKie envisages 'a professional priesthood in Neolithic times' (MacKie 2009, p.11) performing sophisticated astronomical observations, creating a16-month calendar and utilising complex geometry (McKie 1997; 2009), arguments I find unconvincing. A detailed discussion is beyond the scope of this chapter. Suffice to say that

this thesis is in complete agreement with the arguments refuting McKie's claims as put forward by Ruggles and Barclay (2000). The arguments presented in this chapter are thus superficially compatible with McKie's concept of 'astronomer-priests' but see the astronomical observatory role as far less complex than McKie, and only part of the story.

Stonehenge as a health centre

Widely reported in 2008 was the theory by archaeologists Timothy Darvill and Geoffrey Wainwright that Stonehenge operated as a form of health spa (see for example Tierney 2008). In Neolithic times, along with risks associated with vipers, hornets, wolves, aurochs, brown bears and wild boar there is evidence of abscesses and inflamed gums, malnutrition, polio, sinusitis, tetanus, tuberculosis and osteoarthritis, with the assumption of the existence of diseases which won't show up in the archaeological record, such as plague and malaria. In the landscape there were poisonous flowers, such as foxgloves, crocus and the black cherries of the night shade (Burl 2002, pp. 88, 110). There will have been bone breakages and headaches, mental health issues…the list goes on.

There is no doubt that the knowledge maintained by a knowledge elite would have included information on dealing with all these health issues. The arguments presented in this chapter are thus compatible with the argument that health was a concern for the knowledge elite at Stonehenge, but sees this aspect as only part of the story.

Common forms require a common story

Monuments in the form of henges, stone circles and passage cairns were constructed all over Britain and Ireland during the third millennium BC, showing a consistent pattern, yet local implementation (Thomas 1996, p. 134; Ruggles 1999, p. 85; Cummings 2008, p. 149). With these monuments numbering in the order of 10,000, Sharrat (1990) sees the monuments as being associated with the spread of the cultivation of cereal and a cause, rather than consequence, of social complexity. Any theory for the purpose of Stonehenge must place it within this widespread tradition.

The Stonehenge / Durrington Walls complex of monuments demonstrate nine of the ten indicators of a knowledge space, as described in Chapter Eight.

The ten indicators of knowledge as power

1. A stratified society with no sign of individual wealth or coercion

The construction of Stonehenge was a formidable organisational feat (Renfrew 1997, p. 8), yet Parker Pearson argues that the funerary record of Neolithic Britain is akin to that of an egalitarian society led by 'charismatic spiritual leaders and ritual specialists' (1998, p.

323). The tendency over the life of the monument appears to be towards a greater emphasis on individuals, particularly males (Bender 1992; Hanks 2008, p. 261; Lillios 2008, p. 235) with the trend to single burials beneath round mounds being one of the characteristic aspects of the early Bronze Age (Thomas 1999, pp. 155-62). Thus the archaeology is consistent with the transition from a small-scale, primarily egalitarian society with elders gaining knowledge and power through initiation, to one similar to the North American and African sedentary cultures, where power is granted to a restrictive form of secret societies who maintain power through the control of esoteric knowledge.

The archaeology indicates a transition of power to individuals and a warrior class which occurs as the monuments are abandoned. Bradley writes that in the Later Bronze Age, the power of a traditional elite appeared to be diminishing (2007, p. 186) with the henges and stone circles, ringworks and hillforts all in use at the same time (Bradley 2007, p. 224). The early Iron Age transition is linked with the emergence of high-status warriors and new forms of social practices (Hanks 2008). At the same time, weapons, along with personal ornaments, began to appear in small round barrows, usually associated with one inhumation burial (Bradley 2007, p. 150). ‘By the end of the second millennium BC virtually nothing seems to have remained of a tradition of communal monument construction that had existed for some 3000 years’ (Ruggles 1999, p. 85). Across Britain and Ireland, more than1000 stone circles had been deserted by the Iron Age (Burl 2007, p. 27). Tellingly, given the importance this thesis attributes to the ditches, many earthworks were converted from flat-bottomed ditches to ditches with a sharp V-profile in the Iron Age hillforts (Bradley 2000, p. 150).

2. Large investment of labour for no obvious reason

The time commitment invested by Neolithic communities grew with the size of the communities. Renfrew (2007, p. 158) gives rough figures for the various monument types: long barrows of early Neolithic Wessex, and chambered cairns, such as those in Orkney, serving the local community, at about 10,000 work hours; causewayed enclosures took about 100,000 work hours; henge monuments served a wider region, each representing about 1 million work hours while Stonehenge took something like 30 million work hours by the time the sarsens were in place.

In talking about the massive effort involved in constructing the Ring of Brodgar, estimated to have taken 80,000 man-hours for the ditch alone (Towrie 2004), Towrie quotes archaeologist Dr Colin Richards as suggesting

> that the act of building the monuments, in particular erecting the individual stones, was the ritually significant element and that the entire stone ring had no particular function.

> This, he suggests, may explain why there is a distinct lack of evidence that sites such as the Ring of Brodgar were actually used (2004).

This thesis has no argument with the case made by Richards (2004) that the erection of the stones may have been ritually significant. However, it is argued here that the function was to serve the need for a formalised knowledge space. Such a purpose is entirely consistent with the enormous effort required to construct Stonehenge and other Neolithic monuments.

3. Public and restricted ceremonial sites

The increasingly restrictive nature of Stonehenge is generally acknowledged (for example, see Bender 1998, pp. 57-60; Bradley 2000, pp. 104-5, 127; 2007, p. 102-3; Cummings 2008, p. 145; Ruggles 1997, p. 225; Tilley et al. 2007, pp. 187-9;). The erection of the sarsens served to restrict access to the original bluestones, by then in the centre of the site.

> The hidden presence of the bluestones within the monument situated both inside the outer sarsen ring and inside the trilithon setting strongly suggest that the whole building project was designed to guard, shield, and conceal the exotic bluestones from the outside world (Tilley et al. 2007, p. 192).

Two pallisades were also erected to further restrict access to the site (Bradley 2007, p. 139). By the end, the ‘sense of exclusion at the reconstructed stone Stonehenge seems palpable’ (Bender 1998, p. 60). Ruggles (1997, pp. 221-5) notes specifically that the observation of the solstices appears to get gradually more exclusive.

As Stonehenge became more secretive and restricted, a site for public performances would have been required. It was when the sarsens were erected at Stonehenge that Durrington Walls and Coneybury Hill were constructed, both within walking distance of Stonehenge. Stonehenge shows little sign of massive feasting when compared with ceramics, lithics and faunal remains at Durrington Walls and Coneybury Hill which indicate conspicuous public participation (Parker Pearson et al. 2006, p. 232; Thomas 1999, pp. 178-9). Cattle and pigs were herded to Durrington Walls from distant parts of Britain, some as far away as Wales (Balter 2008, p. 1704).

The dichotomy between the public and restricted space is noted for many monuments, such as West Kennet Long Barrow (Thomas 1999, pp. 136, 204, 216), the ‘passage graves’ of Orkney and the Boyne Valley (Bradley 2007, p. 116) and Silbury Hill (Bradley 2007, pp. 130-1).

4. Monuments that reference the landscape

Tilley et al. (2007, pp. 187-203) write that Stonehenge appears to be very carefully located within the landscape to reflect significant natural places, such as two distinctive natural hills which are topped by unusual smooth pebbles. This is consistent with a wide range of Neolithic monuments that reference the landscape[28].

> As people settled, they needed to construct replacements for the natural forms, referencing the rocks, cliffs, rock stacks, fissures, solution basins, water courses, caves, trees and other natural features used previously as they moved through the environment over an annual cycle (Tilley & Bennett 2001, p. 36).

The building of the monuments prevented the significance of particular landscape places being lost and forgotten (Tilley 1994, pp. 204-6). Early Neolithic cursus monuments which predate the henges, also reference the landscape (Barrett 1994, pp. 137-8; Cummings 2008, pp. 149-51; Thomas et al. 2009, p. 52). The Greater Stonehenge Cursus, dated at 3015-2935 cal BC (Thomas et al. 2009, p. 49) is considered to have formalised a pre-existing routeway with a large long barrow at the eastern terminal, the mound showing no sign of a human burial (Thomas 1999, pp. 168, 171).

5. Signs of a prescribed order—the Method of Loci

As described in Chapter Three, the ideal set of locations must be in a definite sequence, should be in a location away from distracting passers-by, well lit, with loci not too much like one another, of moderate size, with a moderate distance between them (Yates 1966, pp. 4-9). A stone or timber circle on the peripheries of daily activity, would serve this purpose extremely well. Stonehenge was located on the periphery of the ordinary settlements (Bender 1992, p. 748) as were other Neolithic monuments (Bradley 2007, p. 75; Cummings & Pannett 2005, p. 15).

Some writers believe that the bluestones were not transported from Wales, but arrived

[28] The theme of landscape is a prominent one in contemporary archaeology, especially since the publication of the influential *A phenomenology of landscape* (Tilley 1994). A broad range of British and Irish Neolithic monuments are argued as referencing the landscape, for example see Bergh (2002, pp. 139-40), Bradley (2000), Cummings & Pannett (2005, p. 15) and Tilley and Bennett (2001, p. 360). For a discussion of landscape references at Avebury, see Watson (2001a, p. 302, 306), for Orkney, see Richards (1996, p. 205) and Cummings and Pannett (2005, pp. 15, 23), and for the chambered monuments of south-west Wales, see Tilley(1994, p. 109). Distinctive pebbles, stone or non-utilitarian polished axes at many Neolithic sites appear to have made reference to significant landscape locations (Bradley 2000, pp. 88, 90-91, 120; 2007, p. 103; Cooney 1998; Cummings 2008, p. 155; Jones 2007, p. 182, 188; Thomas 1999, p. 208).

on Salisbury Plain due to glaciation. Part of their evidence is the variety of stones chosen, 'a mongrel collection of dolerites, rhyolites and tuffs, from various parts of south-west Wales' (Burl 2007, p. 19). 'If men really did transport the stones hundreds of miles they would not casually collect an indiscriminate mixture of stones…' (Burl 2007, p. 193). Arguing for glacial transport, rather than human, Williams-Thorpe et al. (1997, p. 315) write that 'this great variety does not speak of careful human selection'. However, the more contrast, the more variety, the more spots and blobs and shapes and colours within the natural rock, the easier it would be to create the mnemonic images needed. The builders of Stonehenge chose exactly what they needed.

While walking slowly around Avebury, or around the much smaller Boscawen-un circle in Cornwall, it is clear that each stone is distinctive, thus making it easy to identify and associate with a portion of the oral tradition while moving around it. All the factors advised for optimising a set of sequenced loci are met. It is therefore logical to argue that stone circles were a mnemonic technology which was widely adopted simply because it worked so effectively.

Figure 11.22 Boscawen-un stone circle, Cornwall. Photograph: Lynne Kelly.

Timber circles would also provide the same mnemonic technology, but can be carved or painted. Measuring 40 metres in diameter, the Southern Circle at Durrington Walls contains more than 200 post holes dug over at least three centuries which held timbers, each

up to a metre in diameter (Parker Pearson 2007; Parker Pearson et al. 2006, p. 235). Thomas (2007, p. 147) concluded that the Southern Circle was unroofed and that 'the individual posts would have had specific meanings and histories'. Even though there are multiple circles, an overall prescribed order is still evident. Thomas reaches the 'inescapable conclusion' that the Southern Circle was designed to encourage people to move in a specific order through the four outer, and then the two inner circles (1999, p. 58). The control of the order of movement through Neolithic monuments has been observed for many monuments (see for example Bradley 2000, pp. 104-5, 127; 2007, pp. 102-3) including Stonehenge, Durrington Walls and Woodhenge (Thomas 1999, pp. 182, 217).

Figure 11.23 Small posts indicating the location of the large posts which formed the concentric circles at Woodhenge, part of the Durrington Walls group of monuments. The figure has just passed through the two entrance posts. Photograph: Lynne Kelly.

As yet, no satisfactory theory has been proposed for the purpose of these stone and post circles, however, it is clear that they would work superbly as a set of loci, especially if the posts were decorated.

6. Acoustic enhancement

The physical structure of Stonehenge, in particular the sarsen arrangements, would have enhanced sound and caused reverberation within the circle, along with restricted transmission beyond the sarsens (Watson & Keating 1999, p. 335; Crewdson & Watson 2009; Till 2009). Moving towards the centre of Stonehenge, there would have been a dramatic increase in sound intensity, along with echoes and standing wave patterns (Watson 2006, pp. 17-8). However, the degree to which the acoustics was an intentional aspect of the design needs to be questioned (Pollard 2009, p. 1). Significant acoustic effects have been reported for

a number of Neolithic monuments, in particular passage cairns (Devereux 2006, pp. 27-28), recumbent stone circles (Watson & Keating 1999, pp. 326-7), Avebury (Watson 2001a, p. 308) and the Ring of Brodgar (Watson & Keating 2000, p. 260).

Till offers substantial scientific evidence for 'powerful acoustic effects' and acknowledges sound as a 'primary focus for accumulating knowledge, culture and information in prehistory' (2009, p. 18). Till then descends into speculation on the use of sound in the Stonehenge with a narrative laden with calls to the supernatural, trance states, hallucinogenic drugs and reference to the main player as 'the trancer' (2009, pp. 35-9). It is disappointing that his interpretation gives scant consideration to the possibility of rational intellect in a culture which left clear evidence of extraordinary practical skills.

Although experiments report on the acoustic enhancement of stone settings, I was unable to find any consideration of the acoustics from within the ditches in the literature. In henges, including Stonehenge, performances in the flat-bottomed ditches would create resonance and echo. The ray traces I have sketched (see Appendix D) suggest that those on the surface and bank would hear distorted sounds which would appear to emerge from the ground, as well as from the ditch, an analysis confirmed through discussions with acoustic engineer, Pam Clements (2009, pers. comm.). This is reminiscent of experiments with drums within Campster Round passage cairn, the resulting sound outside was not only distorted but also 'perceived to be rising up from the ground rather than the tomb itself, which was quite striking' (Watson & Keating 1999, p. 330).

7. Astronomical observations and calendrical devices

Low-precision astronomical alignments are found repeatedly among henges, stone and timber rings (Ruggles 1999, p. 131) and earlier monuments, such as the Dorset Cursus (Bradley 2007, p. 65). 'In order to organise the agricultural year, to optimise the yields and to organise vast numbers of people to build the monuments, timekeeping becomes an even more critical role' (Couch 1990, p. 155). It is argued here that the primary purpose of astronomical observations is to maintain the agricultural and ceremonial calendar, although ethnographic evidence, as presented in Chapter Five, would suggest that constellations of stars were probably also used as conceptual metaphors.

At Stonehenge, the circle of Aubrey holes holding the original circle of bluestones, does not seem to have been aligned on the solstices (Johnson 2008, p. 106). This is entirely consistent with a culture maintaining the calendar from terrestrial events, or astronomical observations which can be made while still mobile. It is only with settlement that solstice observations can be made reliably. Hence, it is not surprising that the entrance and the positioning of the inner stone arrangements, during Stage Three, involved a shift in the

monument's axis to bring it into line with the midsummer sunrise and midwinter sunset (Bender 1992, p. 746; Ruggles 1999, p. 138). As access to the interior became more controlled, the spectacle of the midsummer sunrise as it passed between various pairs of stones, including the Heelstone and its companion, would only be visible to a very restricted number of people (Ruggles 1997, p. 221).

Stonehenge, Durrington Walls and Woodhenge enabled multiple observations of the solstices, a summary of which is given below, adapted from Ruggles (2007, p. 21).

	Inward Direction	**Outward Direction**
Stonehenge	Midwinter sunset	Midsummer sunrise
Woodhenge	Midwinter sunset	Midsummer sunrise
Durrington entrance	Midsummer sunset	
Durrington South Circle		Midwinter sunrise

All four observations, midwinter and midsummer, sunrise and sunset, can be made from within the two linked sites. This enables multiple observations to confirm the timing of the solstices, which would each be observable over a number of days. The redundancy allows for inclement weather and serves to act as a check on observations made.

The highly restrictive astronomically aligned passage cairns (Maeshowe in Orkney, Newgrange and Cairn-T in County Meath, Ireland) would not be able to serve as observatories as the sky is not visible from within, however they could be used to aid the maintenance of a calendar, among other purposes.

There are indications of lunar symbolism in the early stages of Stonehenge (Ruggles 1997), however, the complex observations and advanced mathematics suggested by Thom (1972; 1978) and McKie (1977b; 1997), among others, is considered unlikely, this thesis being in complete agreement with the rebuttal put forward by Ruggles and Barclay (2000).

8. Rock art as mnemonic

Rock art is not a significant feature at Stonehegne or Durrington Walls. At least 10 of the sarsens at Stonehenge are known to have some form of prehistoric rock art engravings on them, showing axes and other motifs (Darvill 2006, p. 130). These carvings were added to three of the largest sarsens at Stonehenge right at the end of its life (Bradley 2007, p. 141), so are not considered highly significant when analysing the purpose of the monument being built. Whether there were any engravings on the ditch walls, as at the comparative enclosure discovered at Flagstones, Dorset, is not known (Darvill 1997, p. 179).

British archaeologist, Richard Bradley writes that abstract art in the British Neolithic is more often located remotely, and in restricted sites while naturalistic designs tend to be

found closer to settlement sites. He suggests that control over the meaning and interpretation of the rock art may have been an important source of power (Bradley 2000, pp. 70-71). As described in Chapter Three, abstract art enables the encoded meaning to be restricted to those initiated into the knowledge. It also permits a multiplicity of meanings to be encoded into the same design. Representational art is more likely to be able to be interpreted by a larger audience. This interpretation is entirely consistent with Bradley's observations.

9. Enigmatic decorated objects

The assemblages from the later Neolithic show a growing production but an increasingly restricted circulation of a range of distinctive artefacts (Bradley 1982, p. 37). This section will argue that chalk plaques found near Stonehenge, the Folkton Drums, carved stone balls and, in particular, the pottery type known as Grooved Ware are examples of portable artefacts which could have been used as Neolithic mnemonic technologies. Many of these objects shared similar motifs to those found in rock art and the chambered monuments, including those in the Boyne Valley (Bender 1992, p. 749; Thomas 1999, p. 119; Jones 2002, p. 107; Jones 2005, pp. 115-16). Thomas notes that the shared motifs 'all tend to be geometrical rather than representational – another point which demands consideration' (Thomas 1999, p. 98).

Chalk Plaques

Close to Stonehenge, a number of carved chalk plaques have been found with abstract designs for which no purpose has been able to be assigned (Cleal et al. 1995, pp. 399-404; Darvill 2006, pp. 100, 103; Thomas 1999, p. 176). The dimensions of the plaques are 76 x 72-65 x 13mm, weighing 96g and 56 x 56 x19mm, weighing 76g (Jane Ellis-Schön[29] 2011, pers. comm., [email] 15 December). These are ideal sizes for hand held mnemonic devices.

Figure 11.24 Carved chalk plaques from near Stonehenge. Image © Courtesy of Salisbury & South Wiltshire Museum. Reproduced with permission.

[29] Collections Manager / Curator of Archaeology, Salisbury & South Wiltshire Museum

The Folkton Drums

The unique set of incised chalk objects known as the Folkton Drums share many design features with the art on the passage cairns and Grooved Ware (Thomas 1996, p. 158; Middleton et al. 2004). Ranging in diameter from 104 mm to 146 mm (Middleton et al. 2004) they are the perfect size to be hand held, much like the chalk plaques and Scottish carved stone balls.

Figure 11.25 Folkton Drum. Image © Trustees of the British Museum. Reproduced with permission.

Carved stone balls

The most clear cut example of a mnemonic technology appears to be the carved stone balls of the Scottish Neolithic as described by Marshall (1977), Thomas (1996, pp. 162-3) and MacGregor (1999). Marshall examined 387 of these stone balls, 375 of which had diameters of about 70 mm, with 12 being 90-114 mm in diameter (1977, p. 40). Having personally held a number of the 70 mm balls, it is clear that they are a natural size to be held in the palm of one hand, as would suit a mnemonic device. Nearly half of Marshall's sample had six knobs, some decorated, some not.

Figure 11.26 Carved Stone Balls, Hunterian Museum, University of Glasgow. Photograph: Lynne Kelly.

Figure 11.27 The Towie Ball, Museum of Scotland, Edinburgh. Photograph: Lynne Kelly.

If the carved stone balls were to be used as memory aids, then it would be necessary to be able to identify individual knobs and follow them in sequence. Although this is clearly the case for the highly decorated balls, such as the Towie Ball (see Figure 11.27), and for those with six knobs, it is far less obvious in the undecorated balls with many more knobs, such as Figure 11.28.

Figure 11.28 Many-knobbed carved stone ball, Museum of Scotland, Edinburgh. Photograph: Lynne Kelly.

When such balls were examined from both the Hunterian Collection at the University of Glasgow, and the collection held at the Museum of Scotland in Edinburgh, then an orientation could be determined immediately. The knobs were not identical, nor evenly distributed and the orientation could be determined easily once one specific arrangement of knobs was noted. Although this does not prove that such a method was used, it indicates that all balls examined were able to be sequenced and therefore would work extremely well as hand held mnemonic devices.

Grooved Ware

Grooved Ware is a distinct form of pottery found across many Neolithic sites, including deposits found concentrated in the area surrounding Durrington Walls (Thomas 1999, p. 182). A consideration of the various decorated Neolithic pottery types is unfortunately beyond the scope of this thesis, but there is every reason to believe that

Grooved Ware was the most significant for this argument. Bradley (1984, pp. 50-2) writes that Grooved Ware sites seem to be far richer than those associated with Peterborough Ware and other forms. At the massive Mount Pleasant henge in Dorset, for example, the proportion of Grooved Ware in the pottery assemblage rose from 0.5% to 98.6% with the construction of the enclosure. Thomas (1996, p. 150) writes that Grooved Ware is associated with large henge monuments, chambered monuments, formal pit deposits and other elite indicators. As Thomas writes, 'Such a symbolic repertoire might serve both as a means of elite communication (thereby enhancing solidarity) and as a form of restricted knowledge, whose significance would only be fully appreciated by the initiated' (1996, p. 155).

> Grooved Ware seems to be the first ceramic tradition to carry significant symbolic content, as its decorative schemes are obviously much more complex than anything preceding it in the British Isles, and also occur in other media, principally in Passage Grave art (Cleal 1988, p. 142).

Grooved Ware from Durrington Walls was examined at the Alexander Keiller Museum, Avebury, under the guidance of Grooved Ware expert, Dr Rosamund Cleal, with permission granted by Professor Mike Parker Pearson (2010, pers. comm., [email] 23 April).

Figure 11.29 Grooved Ware, Alexander Keiller Museum. Photograph: Lynne Kelly.

Cleal (1988) found that individual vessels of Grooved Ware may be quite distinctive and were repaired significantly more often than the other decorated styles, which she suggests might be linked to its high symbolic content and apparent role in ritual. The level of repair did not happen with other styles of pottery during this period (Bradley 2000, p. 122). In some cases, it seems that broken pots had been repaired, even though they might have remained functionally imperfect as containers (Thomas 1999, p. 113).

Particular motifs appear to have distinct significance, making it one of the most formal and complex 'material languages' of prehistoric Britain (Thomas 1999, p. 117). The knowledge associated with the abstract motifs appears to have been restricted (Bradley 2005, p. 101; Thomas 1996, p. 155). In fact, analysis of distributions and substyles of Grooved Ware suggest subdivisions within the users (Jones 2002; Parker Pearson et al. 2006, p. 244; Parker Pearson 2007a, p. 141; Thomas 1999, p. 120) as would be expected with a mnemonic technology.

Mnemonic devices may be deliberately destroyed if there is not a suitable initiate to take over their use, as is the case with the birchbark scrolls of the Ojibwa (Vennum 1978, p. 760; Rajnovitch 1994, p. 61). Individual decorated vessels of Grooved Ware were deliberately broken before deposition (Bradley 1984, p. 51; Gibson 2005, p. 19).

Phalluses

Some representational objects have also been found, in particular, phallic shapes. Ribald humour, along with lessons of sexual expectations and taboos, are a common aspect of oral tradition (for example see Finnegan 1988; Rose 1992, p. 105; Schmidt 2006, pp. 139-52; Tacon 2008, p. 170 among many). Hence the existence of phallic objects and genital-shaped flints at Durrington Walls (Parker Pearson et al. 2006, p. 253) and phallus at Stonehenge (Cleal et al. 1995) among many Neolithic sites (Teather 2007) are no surprise.

Stone axes

Bradley writes that stone axes, polished such that the source of the material could be readily identified, moved over very long distances, which indicates a non-utilitarian role (2000, p. 120). By referencing the landscape location, Bradley describes them as specialized objects which brought the knowledge of the remote locations with them. One source of stone axes was the Preseli Hills, also the source of the Stonehenge bluestones (Bradley, 2007, p. 140).

Figure 11.30 Polished stone mace head at Orkney Museum. Photograph: Lynne Kelly.

Bones as mnemonic

Human bones were curated during the Neolithic. The bones of the dead appear to have circulated widely among the living, treated as relics (Bradley 1997, p. 25; 1998, p. 53; 2000, p. 122; 2007, p. 84; Thomas 1999, pp. 137, 226). The bones represented only a small proportion of the population and were manipulated in the inner chambers of chambered monuments (Thomas 1999, p. 136).

> Like other artefacts, earlier Neolithic bodies were subject to circulation, their parts were moved from place to place, and combined with other materials in acts of deposition….This encourages us to conceive of megalithic tombs and earthen long barrows as places of transformation rather than vaults or graves (Thomas 1999, p. 226)

The Akan, of Ghana and Ivory Coast, used skulls and jaw bones of past rulers as mnemonic aids (Vansina 1985, p. 45). The use of human and animal bones by knowledge specialists has been widely recorded, such as in New Guinea (Barth 2002, p. 4) North America (Radin 1911, p. 153; Rajnovich 1994, p. 101) and the Arctic (Bradley 2000, p. 8).

Curated animal bones, which were already between 70 and 420 years old, were deliberately buried at the base of the newly cut ditch at Stonehenge (Thomas 1999, p. 28; Pitts 2001, p. 105). The proportion of wild animals is high in the material examined from the secondary ditch fills at Stonehenge, in strong contrast to other Neolithic sites such as

Windmill Hill and Durrington Walls (Cleal et al. 1995, p. 450). If these bones were part of a mnemonic repertoire, then the reference to hunter-gatherer times at Stonehenge, the oldest and most restricted site, is to be expected.

Pollard and Ruggles write that the pattern of deposition of animal bones and carved chalk at Stonehenge was due to careful positioning (2001, p. 76). One segment, for example, was associated with fox bones, while another segment had two piglet skeletons, deposited centuries apart (2001, p. 73). Noting the odd collection of wild and domestic species, Pollard and Ruggles concluded that the assemblage is not reflective of everyday economic concerns but reflects a wider world (2001, p. 80). Pollard and Ruggles (2001, p. 75) argue that a convincing link can be made between the deposits of flint-working debris, antler, cattle bone and worked chalk in the ditches of some long barrows and the exact same combination at Stonehenge. This pattern is entirely consistent with the ditches being used as memory loci.

10. An imbalance in trade

There is no suggestion that the henge sites, including Stonehenge, were the location of any form of production or material exchange. Yet there was a massive input of labour, stones, timbers, curated objects and the need for foodstuffs to support the construction of the monuments. It is suggested here that what was traded for these valuable items was knowledge. In fact, Parker Pearson writes that Durrington Walls was a ‘consumer’ settlement rather than a ‘producer’ site (2007, p. 142).

Conclusion

This chapter could only discuss a small portion of the archaeological material listed in the bibliography. However, that broader reading indicates that the theory will stand up to a much more widespread and thorough investigation. That must wait for a later time.

The analysis of the set of ten indicators for the power of knowledge offers strong support for the purpose of the Stonehenge complex of monuments, and megalithic monuments all over Britain and Ireland at the same time, as being constructed as memory spaces. These monuments were places where the oral and material mnemonics served to aid the knowledge elite to retain power through control of knowledge. While knowledge was the predominant source of power, then the mnemonic structures and objects were the predominant sign of the culture. As individual power and a warrior class emerged, eventually even Stonehenge was abandoned.

In the end, the monuments simply lost their meaning.

Chapter 12 – Conclusions

This thesis has been constantly at risk of becoming unmanageable in scope due to the many disciplines it crosses. Each discipline has its own theoretical background, each has its own multiple case studies to explore. The thesis was thus necessarily constrained. A number of issues were of particular interest, but are beyond the scope of the current project. Some of these simply cannot be ignored and are mentioned here as future directions for research arising out of this thesis.

Primary Orality in historical oral cultures

The starting place for this thesis was in the understanding of primary orality and the link to oral mnemonic technologies, as discussed by Ong (2002 [1982]), Finnegan (1970; 1977; 1988), Goody and Watt (1963), Goody (1977; 1987; 2006; 2010), McLuhan (1967a) and Havelock (1963; 1978; 1986; 1991) among many. Oral technologies leave no immediate trace in the archaeological record. This thesis identifies material mnemonic technologies, generalises them and then looks for those generalisations in the archaeological record. The exploration of mnemonic technologies from historic oral cultures, and through museum collections, has a great deal more to offer, not only from an anthropological perspective, but also to inform archaeology. Bringing studies of orality and of mnemonic technologies to archaeological interpretation reconfigures our understanding of the sites. This new approach provides the evidence for an argument that monumental sites from small-scale cultures were constructed and used as mnemonic knowledge spaces for knowledge elites to maintain, teach and transmit of not just spiritual beliefs and history, but also a vast corpus of practical information encoded within an integrated knowledge system.

In a literate world, the dependence on memory is greatly reduced, however a deeper understanding of the non-literate technologies oral cultures used also has a great deal to offer contemporary education. The experiments I have conducted in translating non-literate mnemonic methods into a literate context can be found in Appendix A. As an educator, I can see many applications which warrant further research. Through understanding of the value of such technologies within schools, I have no doubt that the intellectual complexity of indigenous cultures will be much more broadly appreciated by students.

To build a database of mnemonic technologies from all cultures, non-literate and literate, would not only be a fascinating task, but also be of value to a broad range of disciplines.

From mnemonic to aesthetic: art across the orality / literacy divide

Nungarrayi's comment, quoted in Chapter Three, is highly significant when considering the history of art. 'For Australian Aboriginal people, art is never primarily for aesthetics. It is always to help remember Country, the stories and the knowledge' (2010, pers. comm., 19 November). A number of writers talk about the role of art in oral cultures questioning the importance of aesthetics in the creative process (see for example Morphy 1991; 1998; Roberts & Roberts 1996a; 1996b; 2007; Brokaw 2010, pp. 46-8). Innis describes a change in the spatial organisation of art as literacy became the dominant communication medium in ancient Greek society (1964, pp. 109-10). In visiting the Metropolitan Museum, New York, and The British Museum, London, I viewed the displays for each culture in terms of whether the objects were created by oral or literate cultures, particularly concentrating on cultures, such as the Greeks, who moved from orality to literacy. I was looking for a change in purpose from mnemonic to aesthetic. I gained the impression that the distinction was marked, but it would require a great deal more research to substantiate such a conclusion.

Expanding the current case studies

The Mississippian mound building tradition continued long past Poverty Point times, leading to sites such as Cahokia, Illinois (Pauketat & Alt 2003; Pauketat 2004). It would be fascinating to trace the mnemonic technologies and see if some kind of continuum can be detected. The arguments by the Southeastern archaeologists discussed in Chapter Ten, which challenge established ideas about 'simple' hunter-gatherer cultures, are of the utmost importance. The approach taken in this thesis has a great deal more to offer that debate.

The Ancestral Pueblo cultures offers an unparalleled chance to follow multiple linked cultures through tracing the indicators of the knowledge system and associated technologies as populations migrated and interacted over the centuries to the contemporary settings. This would involved tracing the change in technologies into the post-Chaco era, through the Pueblo III sites including Mesa Verde (Lipe & Varien 1999) and then into historic Pueblo cultures. There are many aspects of Southwestern archaeology which would be fascinating to examine through the understanding of knowledge systems, such as the centuries of Hopi petroglyphs (Bernardini 2009) and the origins of the Kachina cult (Adams 1991). The concepts presented in this thesis also offer an approach with which to reconsider Leckson's ideas about the Chaco meridian and the link to Mimbres and Paquime (1999).

There is a great deal more to be explored from a detailed examination of the European Neolithic archaeological record. For example, the sequence of deposits in the Stonehenge ditch (Pollard & Ruggles 2001) may offer further insight into the use of ditch segments when

coupled with a seasonal cycle. A brief look at the structures of megalithic sites such as Carnac in Brittany, France (Mohen 1999) and of timber and stone circles, such as the timber circles in the Netherlands (De Jong 1998), indicated the application of similar technologies over a much broader area than just Britain and Ireland.

Orkney has an unparalleled range of British Neolithic archaeology, many in close proximity to each other. I was able to walk between passage monuments such as Maeshowe and Unstan, the massive stone henge site, the Ring of Brodgar, the Stones of Stenness and the Barnhouse village site. The Orkney Islands have Neolithic house clusters, such as at Skara Brae, a range of buildings, settlements on different islands and archaeology beyond the Neolithic such as the Iron Age brochs. New discoveries in current excavations indicate a much more complex set of inscribed buildings and objects is being uncovered (Nick Card 2012, pers. comm., [email] 16 February). Similarly, an exploration of the Neolithic record for the Irish Boyne Valley is likely to offer further insights into the purpose of those monuments.

What happened to the role of knowledge keeping after the stone circles had been abandoned? Timekeeping seems to have become incorporated in the alignment of the round houses in the later Bronze Age and Iron Age (Bradley 2005, p. 56; Green 1998, p. 196; Ruggles 1999, p. 153). However, the culture still needed a knowledge elite. Bradley (2007, pp. 246-52) considers the term ‘hillforts’ to be a probable misnomer as these sites appear to have served a variety of functions, showing evidence of shrines, performance space for public events, seasonal gatherings, sensitivity to the agricultural cycle and ritually deposited artefacts. In fact, Bradley suggests that these new defended sites may be seen more as ceremonial centres, sharing many features with henges (Bradley 2005, p. 15). To attempt to track the indicators of a knowledge elite through this archaeological record would be intriguing.

Application to archaeological interpretation of other small scale non-literate cultures

Beyond the three case studies commenced in this thesis are many small-scale cultures, and then much larger ones, who left a monumental archaeological record. The pattern I argue in this thesis is reflected when Renfrew writes:

> My approach to Chaco is coloured by my experience of several early societies that are by no means urban but which can nonetheless boast impressive monumental constructions and other presumably symbolic features. Prominent among these are the so-called “temples” of prehistoric Malta, the *ahu* of Easter Island, and in particular the henges and other prehistoric monuments of Orkney (2001, p. 17).

Turnbull (2002) writes about primary orality and the Maltese ‘temples’, including indications of progressively restricted movements within the monuments, ‘oracle holes’ and the transmission of information from a small elite to a larger group. A brief reading of Rapa Nui (Easter Island) archaeology (Flenley & Bahn 2003; Golson 1965; Ladefoged & Graves (eds) 2002; Hunt & Lipo 2011; Stevenson & Cardinali 2008) clearly indicates that it warrants much closer examination in terms of the control of knowledge and the associated power.

Other sites which also seem to relate to the patterns indicated by Renfrew above include the early Egyptian landscape (Malville et al. 1998; Meskell 2003), Knossos in Minoan Crete (Prent 2003), southwest Iberian megalithic tombs and their inscribed slate plaques, (Lillios 2003), ziggurats of Mesopotamia and Central Asia (Couch 1990, pp. 155, 158), the circles of carved pillars at Gobekli Tëpe, Turkey (Banning 2011, p. 619; Curry 2008; Renfrew & Bahn 2008, p. 414), and the elaborately decorated buildings at Catalhöyük, Turkey (Balter 2005) to name but a few.

The Inca landscapes offer much to explore in terms of the role of knowledge. Niles (1999, p. 51) describes the Inca landscapes, the *ceques* and shrines, in terms of a carefully constructed mnemonic pathway, associated with which in the khipu as described in Chapter Three. Brokow (2010) links the *ceque* system of Cuzco to a walked and highly structured framework for the knowledge system. Turnbull writes that physical movement as a basis of knowledge is now apparent in a wide variety of cultures around the world, citing Native American trails, Aboriginal dreaming tracks and Incan *ceque* (2007, p. 142).

Intrigingly, Aveni (1990b) argues for similarities in purpose of the *ceque* system of Cuzco and the Nazca lines of Peru. The importance of movement through memory spaces was emphasised by Nungarrayi when we talked about Australian Aboriginal landscapes and reinforced at the National Museum of the American Indian, Washington, in October 2009 when I met with Native American, Patricia Jollie. Jollie then said that the representational Nazca Lines remind her of the creatures which feature in the Native American stories, especially those of her people, the Navajo. She was keen that I explore the Nazca images from the perspective of knowledge systems and whether I could see a migration link to the Navajo Nation. Although I could find no evidence of the latter, I am indebted to Jollie for her question as further reading indicates that the lines were probably walked paths in ritual landscapes (Aveni, 1990a; Aveni 1990b; Aveni 1993, pp. 25-6; Aveni & Silverman 2008). Aveni (1990a, p. 37) writes that investigators devote too much to the geometrical and astronomical hypotheses while giving too little consideration to the movement back and forth over the lines. Aveni (2008) offers archaeological insights for culture after culture in the New World which demand further exploration from the perspective of the knowledge system.

There are many more the world over.

Among the most intriguing aspects of this thesis for me has been collecting the portable mnemonic technologies. There are many more objects in the archaeological record to be examined from this perspective, such as the 'abundant plaquettes with engraved, painted or both engraved and painted art on them' found in the Parpalló cave in Spain which Davidson links to the transmission of restricted information and the exercise of power (1988; 2005, p. 202; 2006, pp. 11-16).

Rock art in a knowledge framework

Chapter Eight involved a discussion which concluded that rock art is often mnemonic to the knowledge system, but rock art mostly predates the transitional monuments which were the focus of Part Two. This aspect deserves far more exploration using the vast literature on rock art and examination of the images themselves. Lewis-Williams writes that art of the San Bushman of the Kalahari 'does not 'reflect' daily life with its social structures and economy. Nor are the animals depicted a reflection of the range of species that lived alongside the image-makers' (Lewis-Williams 2001, p.18). Instead of exploring this in terms of a rational intellect, Lewis-Williams prefers to discuss ritual specialists in terms of altered states and induced trances (2001, p. 21; Lewis-Williams & Pearce 2005). He then extrapolates these ideas to relating Neolithic rock art, claiming it is related to shamanistic events involving altered states (2005). The trance-like states argument is widely quoted in rock art interpretations. For example, Dowson writes that 'Lewis-Williams has gone on to develop a shamanistic interpretation that has more explanatory power and potential than any other explanation on offer' (2003, p. 73). Lewis-Williams relies heavily on studies of the San Bushman, which Kelly disputes represents any form of pure hunter-gatherer society for hundreds of years, referring to them instead as 'the lowest strata in a class society' (1995 p. 27). Lewis-Williams gives no credit to the depth of knowledge and complexity as indicated in Australian Aboriginal art (see for example Morphy 1991; 1998), the creation of which seems to have little or no relationship to altered states. I am much more inclined to the interpretations as discussed by Davidson when he writes that 'the production of paintings and engravings probably involved ritual, and the communication of meanings beyond those carried by the images themselves' (2010b, p. 6).

In Chapter Eight, I wrote that I do not find the arguments presented by Lewis-Williams convincing and accept the rebuttal by Noble and Davidson (1993, pp. 126-9). It is a logical and enticing extension of this thesis to explore these arguments far more fully, and do so in relationship to the multitude of rock art sites around the world.

How far back can we find evidence of a formal knowledge system?

Davidson (1997) explores the relationship with the land, and with each other, through 'art' created in the in the Pleistocene, an influence on the cultural development of modern humans that he suggests 'was more fundamental than that of Pheidias, Leonardo, Shakespeare or Beethoven' (1997, p. 153). Peiffer's *Creative Explosion* (1982), suggest that items such as message sticks can be detected in the Mesolithic record (1982, p. 201). He explores the origins of art, linking them to the origins of religion. Given that this thesis emphasises the link between the art of oral cultures and the knowledge system, it would be fascinating to explore how far back this link can be made, and how that relates to the origins of modern human thought. As discussed in Chapter Ten, archaeologists working on the Mississippian mound building sites are questioning assumptions about the simplicity of hunter-gatherer cultures. Can we take that investigation back much earlier than the American Archaic?

Conclusion

Humans evolved biologically over hundreds of thousands of years. Modern humans entered Australia in the last 50 thousand years or so, and moved across the massive landscape—into lush rain forest to cool temperate forest, along the coast, and into the desert of the driest inhabited continent on earth. Around the world, modern humans adapted to almost every extreme. How did humans adapt to such extremes so quickly in a way no other animal species can do? This thesis offers a mechanism. Modern humans adapted by using their intellect. Such an incredible feat, however, cannot depend on humans who lived in a fog of superstition or superficial understanding of their environment and social needs. This thesis proposes that modern humans adapted by using rational intellect and formal knowledge systems. It is the role of knowledge which has been sorely lacking in the archaeological interpretation of monumental sites constructed by small-scale cultures.

In listening to Australian Aboriginals talk about their cultures, it is the Dreaming, the knowledge, the law, which dominates discussion. Scared sites are Dreaming sites. Stories are all connected by Country, as are people. At an archaeological conference, I was struck by the contrast between sessions involving indigenous presenters, and those which did not. The Dreaming, scared sites, secret business, the stories in art, the learned environment, the knowledge—these dominated the presentations with indigenous contributors. Other sessions told us a great deal about hearths and tools, scrapers and lithics, topics never mentioned by the indigenous presenters. There is no denying the importance of tools and the archaeological record, but the lived landscape was missing. It is the balance between the intellectual world and the functional one which needs addressing. It is the search for the material representation

of that intellectual world that this thesis addresses.

Was it monumental forms, replacing the knowledge structure based in moving through the landscape, which enabled the sedentary lifestyle necessary for developing or adopting domesticates? It is proposed here that advances in the ability to store knowledge, of which monumentality is a key component, enabled cultures to move to a higher levels of social complexity. It is also proposed that hunter-gatherer cultures, which may be less complex socially, should not be assumed to be less complex intellectually. It is impossible to identify the mnemonic technologies so intricately woven in the travelled landscape unless we have the knowledge keepers themselves to identify them for us. For that reason, contemporary mobile cultures, such as indigenous Australians, have insights to offer that this thesis has only glimpsed. Oral cultures across the world have a depth of knowledge which can not be ignored.

Similarly, to ignore the orality of those who built prehistoric structures around the world is to ignore the essence of their culture and so, it is argued here, dismiss the very purpose of their monumental efforts. We need to acknowledge intellect. Technical, historical, religious intellect—yes. But also rational intellect, the focus of this thesis. Nungarrayi's words have reverberated throughout this research: 'The Elders were pragmatic old buggers. We wouldn't have survived if they weren't' (2009, pers. comm., 20 September).

Having shown in Part One the importance of understanding oral tradition within a knowledge framework, it has also been shown how closely power is aligned with the control of knowledge in small-scale oral cultures. The 'ritual knowledge' clearly includes knowledge of the way ceremonies are conducted and the religious understanding of the culture. Oral tradition may also store oral history. What this thesis shows is that ritual knowledge and oral tradition, interwoven as they are, also encodes essential pragmatic knowledge and a scientific understanding resulting from continued observation of the known landscape. The importance of formal knowledge of animals and plants, of time and space, of how to navigate, retain a genealogy, ensure resource rights are understood, maintain the legal system and hold the information which provides a common understanding of expected morals, must not be underestimated.

All of the knowledge of the culture has to be retained in memory in the absence of writing. Consequently, it is no surprise to find that a range of sophisticated, adaptable and highly effective mnemonic technologies evolved with the system. It is the remains of these technologies which can be seen in the archaeological record. Ten material indicators were proposed to evaluate a given site in terms of the presence of a knowledge elite, and their role within the socio-political structure. The ten indicators are:

1. A stratified society with no sign of individual wealth or coercion
2. Large investment of labour for no obvious reason
3. Public and restricted ceremonial sites
4. Monuments that reference the landscape
5. Signs of a prescribed order—the Method of Loci
6. Acoustic enhancement
7. Astronomical observations and calendrical devices
8. Rock art as mnemonic
9. Enigmatic decorated objects
10. An imbalance in trade

The ten indicators of knowledge as power – a site comparison

The list of ten indicators, as presented, implies that all of the ten indicators are of equivalent value. This is not so. Generalisations must always be made with the caveat that every site needs to be evaluated on its own terms. The non-literate site of Great Zimbabwe, situated in the current country of Zimbabwe, is not considered to be a knowledge centre. Using data from Garlake (1973), Clark and Carrington (2002) along with Chirikure and Pikirayi (2008), a comparison can be made with the sites given in the case studies. A very brief summary of the archaeology of Great Zimbabwe is presented in Appendix E.

Given the basis of the hypothesis, the first indicator, that of a stratified society with no sign of individual wealth or coercion is considered an essential requirement for a site to be considered under the criteria for a knowledge centre. The analysis also indicates the difficulty of making a strong claim to the primary purpose of the site being for the exchange of knowledge when the data are insufficient, as is the case with Poverty Point.

It is the contention of this thesis, however, that Poverty Point, like Chaco Canyon and the Stonehenge complex of monuments was constructed primarily as a knowledge space, while Great Zimbabwe was not.

Indicator	Chaco Canyon	Poverty Point	Stonehenge complex	Great Zimbabwe
1. A stratified society with no sign of individual wealth or coercion	Yes	Yes	Yes	No

2. Large investment of labour for no obvious reason	Yes	Yes	Yes	No
3. Public and restricted ceremonial sites	Yes	Yes	Yes	No
4. Monuments reference the landscape	Yes	Yes, but limited, data insufficient to assess	Yes	No, although the presence of some boulders enclosed within major structures may be considered as significant landscape references.
5. Signs of a prescribed order—the method of loci	Yes	Yes, but this claim is speculative due to insufficient data	Yes	Yes
6. Acoustic enhancement	Yes	No, but again data is insufficient	Yes	No, although there is some speculation about sounds from one cave being of possible significance.
7. Astronomical observations and calendrical	Yes	No, insufficient data	Yes	No. Recent claims to that effect are not

devices				general accepted as valid.
8. Rock art as mnemonic	Yes	No, rock unavailable	Yes, but limited	No
9. Enigmatic decorated objects	Yes	Yes	Yes	The monoliths would serve this purpose, but there were limited portable objects, however, data is limited.
10. An imbalance in trade	Yes	Yes	Yes	No

In evaluating three archaeological sites, and the contexts in which they arose, it has been shown that many enigmatic aspects of monumental sites can be explained in terms of the importance of the knowledge system.

The thesis has necessarily taken a broad brush to the argument that rational intellect is grossly underrepresented in discussions of oral cultures, historic or prehistoric. Consequently, every chapter could have been many times its current length. However, the thesis offers a starting point for discussion and awaits the refinement which can only happen when the argument is debated in the academic domain.

Appendix A – experiments with mnemonic technologies

Over the last three years, I have experimented with various mnemonic technologies in the style of the devices described in Chapter Three. I have created contemporary versions to remember information relevant to my life. Given I cannot eliminate my literacy, these experiments cannot replicate oral technologies. However, the experiments did enable me to better understand the mnemonic technologies addressed in this thesis through experiencing similar technologies and evaluating their effectiveness. In establishing these experiments, I also drew on the writing of modern mnemonists, Alexander Romanovich Luria (1968), Dominic O'Brien (2000), Ed Cooke (2008), Oddjbörn By (2007) and Joshua Foer (2011).

The Method of Loci

The Method of Loci is critical to the interpretation of monumental archaeology in Part Two. Physically moving along a path in the landscape, streetscape or around buildings enables an ordered set of locations to be established. These loci can then be reused for multiple genres of knowledge. In order to experience the Method of Loci, I have established a number of memory paths over the three years. The two described here are those in current use. The first, Hargraves Street Loci, currently involves 18 loci over 2.5 kilometres, but is being expanded. The second, Home Loci, consists of 120 locations around the house and garden with loci only a few steps apart, and will no expand further.

Hargraves Street Loci

Ancient Greek orators used streetscapes for memory paths (Yates 1966, p. 4-9; Fentress & Wickham 1992, p.11). I use a streetscape to provide a set of 18 memory loci. The current set of street loci covers a 2.5 km path along Hargraves St, Castlemaine. The sequence of streets is linked in my mind by a mythological story, superficially like a songline. The story is a strange mix of eras in this area, but it linked the street names in a way that was easy to remember once established. An abridged version of the story follows.

The walk starts with graves from Castlemaine's gold rush past coming to life (Hargraves St) as I emerge from the Forest (Forest St). I pass through 'most' of the shoppers (Mostyn St – the business centre) to the littler of the main roads (Lyttleton St) as reality fades and the emerging ancestors become more real. A temple emerges in the morning mist, filled with the Chinese who long ago came to the gold rush (Templeton St). There is the camp of

the miners, with their church bells ringing (Campbell St, with a church on the corner). Suddenly all the birds take to the air, not only the noisy cockatoos, but also the quiet doves (Doveton St). Something serious is happening to scare them. People are running around as if crazy (Berkeley St), but these are real people in my own time and space. They are afraid of a bull, roaming the streets (Bull St), but the bull looks magnificent to me, in coloured robes and jewels. At the next street is a hunter ready to kill the bull, with guns loaded (Hunter St) and a blockade of cars keeping people away (Parker St). I yell at them that it is not a real bull, it is a beautiful mythical, whimsical bull (Wimble St) who should not be killed, but they won't listen. A policeman comes to haul me away (Hall St). I resist but he turns me (Turner St), marching me away from the scene. He tells me that the hunter, Hal Ford (Halford), will shoot and always gets his kill. I rub the spider ring on my hand to escape this nightmare (Myring St). The mythical bull fades and survives. I retreat to the bush and the ancient times here with the Dja Dja Wurring people (Kaweka St and wildflower sanctuary) and their laws (Lawson St).

Over time I have embellished the story with details of the houses and businesses along the path. They all wove into the story. I am adding everything I learn about the streets named. So I can now locate all businesses and significant locations over the entire area instantly. Details about them, such as the owners of the coffee shop, or the origins of the road names, are now being woven into the story. It has grown enormously into a body of information about contemporary Castlemaine.

I could not have predicted how emotionally attached I have become to my story and my role in it as I act it out. I can play the whole route in my head. As noted in Chapter Two of this thesis, the singing of memory lists invokes the deeper knowledge among those initiated into it, and consequently an emotional response beyond that which non-indigenous researchers would expect when simply chanting of a set of place names. This response has been noted by Bradley (2010, p. 43) when listening to the singing of Yangyuwa songlines, and Rappaport on hearing the sobbing of the Tsembaga men of New Guinea when chanting of place names of their territory (1967, p. 177). This response to singing a songline, I can now understand, although obviously my experience is far less intense.

I could not now write or retell my Hargraves Street story because it is no longer a linear narrative. I can extract whatever information I need, such as where the house with the stunning stone wall is located. If I want to recall my 'subheadings' I simply chant the set of street names, the set of loci, the songline. In my head, a mythical story is playing out, and a mass of associated images amalgamate into a whole which could not be described in linear text such as this. Should I stop at any of the 'sacred sites', I could then tell the story of that street. I am now in the process of adding streets parallel to Hargraves Street as well as those

on the other side of the railway line. Soon all of Castlemaine will be imaged in my memory.

The interwoven nature of the mnemonic devices has also become apparent. As described below, I have used my lukasa to act as mnemonic device for the history of Castlemaine. Although my Hargraves Street songline is relates mostly to contemporary information, the historical overlap occurs. Sometimes the history from the lukasa comes to mind as I walk the streets, physically or mentally. For example, Captain Bull's role in Castlemaine history is encoded in the lukasa material, but interweaves with the mention of him as I cross Bull St.

The Home Loci

I have established a set of 120 loci around the house and garden at home. I do not use a story to link them, but am creating stories associated with each of the 120 'sacred sites' encoding the previously unrelated information. Establishing the 120 places in my memory took a significant effort. However, once the loci were established, I found it remarkably easy to assign information to them. Every fifth location was a window, door or major location in one of the garden spaces, every tenth an entrance to a new space. Consequently, I can get to any number within three steps from one of those key locations. I am using the Home Loci to remember long lists of structured information, much as an oral culture would for genealogies, or sequences of events. This is my major memory structure, the path will remain constant and familiar, but the encoded information will continually grow, much as indigenous knowledge grows with successive levels of initiation. The information stored in the Home Loci is knowledge I have attempted to memorise in the past with very little success.

At present, I am using the loci for four unrelated sets of data.

1. **Spider families.** I am memorising a list of 108 spider families alphabetically by family name. I am adding the common names and identifying characteristics into the story associated with each of the 108 'sacred sites'. New information is added as it is learnt. This is a fairly stable list, but like all 'real world' information, does vary with reclassification. The list I am using is from The World Spider Catalogue (Platnick 2012), as used throughout Kelly (2009). This information is used constantly when responding to readers of *Spiders: learning to love them* (Kelly 2009), in identifying spiders in the field or from photographs sent to me, and when blogging about spiders on *The Spiderblogger* (Kelly 2012). Memorising the scientific names, which often seem meaningless and complicated, is the major challenge. I have found that I have to make associations which are meaningful for me rather then trying to learn the

etymology of the name.

2. **Tarot Cards.** I used a set of 78 beautifully illustrated mediaeval-style tarot cards, each with a detailed and complex image, for storytelling magic routines. As a marked deck, it is hugely advantageous for me, as a magician, to know the details of every image purely from the rank and suit of the card, or whether it is from the major arcana. This set of cards provides a sequence of limited and unchanging information to be recalled. Critically, I use this information in live performance, a situation which is much more stressful than when recalling information under more relaxed conditions.

3. **Chemical elements.** I am encoding the 118 chemical elements in atomic number sequence. Although I have been fascinated by the periodic table since encountering it at school, I found I was only familiar with a few dozen elements, and had very few atomic numbers and chemical properties stored reliably in memory.

4. **Countries of the world.** The countries of the world are stored in population order, from largest, China, to the smallest, Pitcairn Islands. The associated information, and even the countries themselves, will vary constantly. As I hear new information on the news, I try to associated with the appropriate location and in so doing constantly enlarge this knowledge base. With 242 countries, the list wraps around the set of loci twice, with two over. This is the most ambitious experiment, and has a long way to go.

This experiment has taught me that a huge amount of information, of different structures and uses, can be associated with the same set of landscaped locations. Although an ongoing experiment, it became obvious early on that the stories associated with each loci would interweave, enhancing my ability to remember each information item. When a particular item of knowledge is required, my brain visualises incomplete images and associations, but the item of interest emerges clearly. I could not have understood the integrated nature of many knowledge systems without experiencing this phenomenon. This can best be explained in terms of a single location.

Figure A.1 Three of the 78 tarot cards, including the Devil, which is associated with Location 15, der thron.

Location 15

Location 15 is a garden seat which my husband refers to as his 'throne'. It is surrounded by stonework and vegetation, so the entire location can be used as the memory loci. The tarot card associated with this location is number 15 in the major arcana, the Devil. Given this is my husband's favourite seat, I find the association with the devil easy to remember. The associated spider family is a small, obscure group of hunting micro-tarantulas, Paratropididae. I have created an image of paratroopers landing on the throne covered in tiny tarantulas. Acting or dancing this image, I play the Devil ducking to avoid the paratroopers and collecting the adorable little tarantulas makes the family very easy to remember. I also see the paratroopers trying to avoid the devil and miniature tarantulas jumping off to avoid the fire. The chemical element is phosophorus, a highly reactive element, so the association with the fire of the Devil works very well. I find these fortuitous coincidences commonly occurring along the set of loci, but that is not surprising given that I am seeking them.

The associated country is Germany. It happens that the tarot cards I use are German, but the cards are associated with 78 loci, so I cannot use the German origin of the cards as the association. I refer to the chair as '*der thron*', the importance of naming being highly significant in indigenous cultures. I then associate all things German with the chair, and consequently the devil, paratroopers, miniature tarantulas, phosphoric fire and the Devil. It isn't a logical connection, but a visual and emotional one. This chair, *der thron*, is now a vivid, grotesque, humorous place in my mind and thus the associated ideas are highly memorable. As I add more information, such as that the Devil standing on two rocks as in the

image on the card, or Germany's new President being Joachim Gauck, then this information is woven into the story. Theoretically, an infinite amount of information could be added.

Every location has an integrated set of information constantly being reinforced, constantly growing and constantly changing, as is expected with indigenous knowledge systems. Although the information at this stage is primarily factual, some of the associated stories are incorporating moral teachings as well.

Effectiveness of the Method of Loci

I could not have imagined, had I not done these experiments, the difference in mnemonic methods between the devices described here and memory aids from my literate training. For decades I have used the 1-sun, 2-shoe, 3-tree, 4-door … set of mnemonics for lists. These require conscious logical association when using them. When walking either of my memory paths in my mind, I see only the images passing, with no conscious effort to make links. This is much faster and smoother than logical associations. I am most conscious of this when I use a songline for magic routines. I can be performing the patter while my memory is bringing up the necessary tarot card image without the two actions conflicting. I had previously used logical associations for the cards, which I found required a pause in my performance patter for me to consciously make the links. The Method of Loci is a significantly more efficient and reliable form of recall.

I have found it critical not to make an association without being sure it is the correct one as they are very difficult to undo. In one case I associated the wrong spider family, and now need an additional mnemonic to remind me which of the associations is correct. I cannot seem to undo the memory because this system is so effective.

Enigmatic decorated or engraved hand held objects

A number of the hand held mnemonic devices have now been replicated. There are many more to do. In particular, the khipu / quipu is not yet in the set.

Beaded memory board, or 'lukasa'

I have created a hand held memory board, 7 cm by 15 cm, and 1.5 cm deep. It is very comfortable to hold in one hand.

Figure A.2 The memory board in the style of the Luba lukasa made from wood, beads and shells.

I am encoding this 'lukasa' with the history of my home town, Castlemaine. I can no longer look at this board impartially. Each bead and shell has information associated with it, and links to other beads and shells. For example, The Dja Dja Wurrung Aboriginal language group are represented by the string of beads down the top left of the memory board. Details are linked to the individual beads. The founders of the town form the central line of coloured beads. The white cowries represent significant places, such as the Theatre Royal. The coloured bead near the Theatre Royal shell is Lola Montez, who once performed there and caused a near riot. The major expedition of Major Mitchell, and later that of Burke and Wills, are represented by the large cowries top and bottom of the board. Spots in the patterns of the cowrie shells remind me of events within those stories. With the 'lukasa' I can talk about Castlemaine's history without leaving out significant events or locations. Like the Luba do with their lukasa, I can then add further layers to the information encoded on the memory board for other genres such as local geology.

As I become more familiar with each shape, marking and wood grain, I have found that the memory board greatly exceeds all expectations in terms of rapid encoding and effectiveness in aiding memory. I also find that I touch each item, which also enhances memory. This is reminiscent of images I have seen of indigenous cultures using items such as

the lukasa and Australian churinga, where the users were carefully touching the objects as they chanted.

Repetitive carved memory board

Many decorated items have repetitive patterns of dots or lines. I have been reluctant to include these as mnemonic. However, Reefe (1977, p. 49) specifically states that the triangular structures on the back of the lukasa are each used to store specific information. I chose to test this idea using a board (previously the lid of a box) engraved with dots and hatches. It is 8 cm by 12.5 cm, but only 0.6 cm deep. It is very comfortable to hold in one hand.

Figure A.3 The carved wooden memory board.

I have encoded the words of Robert Browning's *The Pied Piper of Hamelin* (303 lines). I have been attempting to commit this long poem to memory for many years, without success. As a child, I heard it recited often. This is reminiscent of indigenous children hearing the stories told in songs, knowing the themes and rhythms. However, I found that to learn it word for word was very difficult. Using this memory board has made the memorisation much easier. As with the beaded board, I have become extremely emotionally attached to this item.

To test for multiple encodings, I have also used the board to aid memory of Francis Thompson's *The Hound of Heaven* (182 lines).

In memorising poetry for performance, I am attempting to gain more insight into the use of memory devices in a performance context.

Bundles of non-utilitarian objects

Mnemonic shells

Figure A.4 The wooden box with 16 cowrie shells.

I have a set of 16 cowrie shells, in the style of the Yoruba ‘divination system, sixteen cowries’ (Bascom 1980) described in Chapter Three. The Yoruba associate each of the 17 possible outcomes (0 to 16 shells with opening face up) with one of sixteen beings on which the system is based. A more complex system involves two tosses and 256 possible outcomes. At this stage I have chosen to associate each of the 16 outcomes with a single novelist, with knowledge of their published works, and lessons taught through their writing, to be associated with each outcome. The ‘0’ outcome I am associating with the chant of the 16 names. The Yoruba have a hierarchy in the beings represented. I have thus listed these 16 novelists in rank order. The authors are all familiar from my early years, which is the closest I could come to the system I am replicating.

Once I could chant the 16 names, then the initial information was fairly easy to associate. Book titles, characters and associated information, such as storylines and moral lessons are now being added as the books are revisited. This system requires constant repetition, as is noted for the Yoruba diviners. However, once a toss is made and the names chanted, the author, or ‘being’, is identified and the associated knowledge can be repeated. I am attempting to create chants for lists of published works to make them easier to remember. I have always had difficulty recalling titles, other than an author’s major work, and in finding

the system helpful, but time-consuming. I have yet to assess the longevity of the information recall. This system does not provide the same level of prompt as the memory loci or lukasa style objects above, nor the systems discussed below. It seems to be far more for training than prompting.

Bundle of symbolic items

Figure A.5 The bundle of symbolic items.

A set of symbolical items has been placed in a small bag in the style of the ‘medicine bags’ described for the North American Blackfoot and West African Mende in Chapter Three. Like the Mende healers do their stones, I am linking each object to a particular disease and associated definitions and information, starting with the most commonly reported dieases. In order to use this in practical life, I am associating people who suffer from a particular illness with the appropriate object. I am adding an object each time I learn of somebody with a disease which is not yet represented in the bundle. By associating the person, or persons, with their object through story, I have found myself much more aware of the facts of the disease, and much more sensitive to the sufferer.

Pictographic representations

Winter count

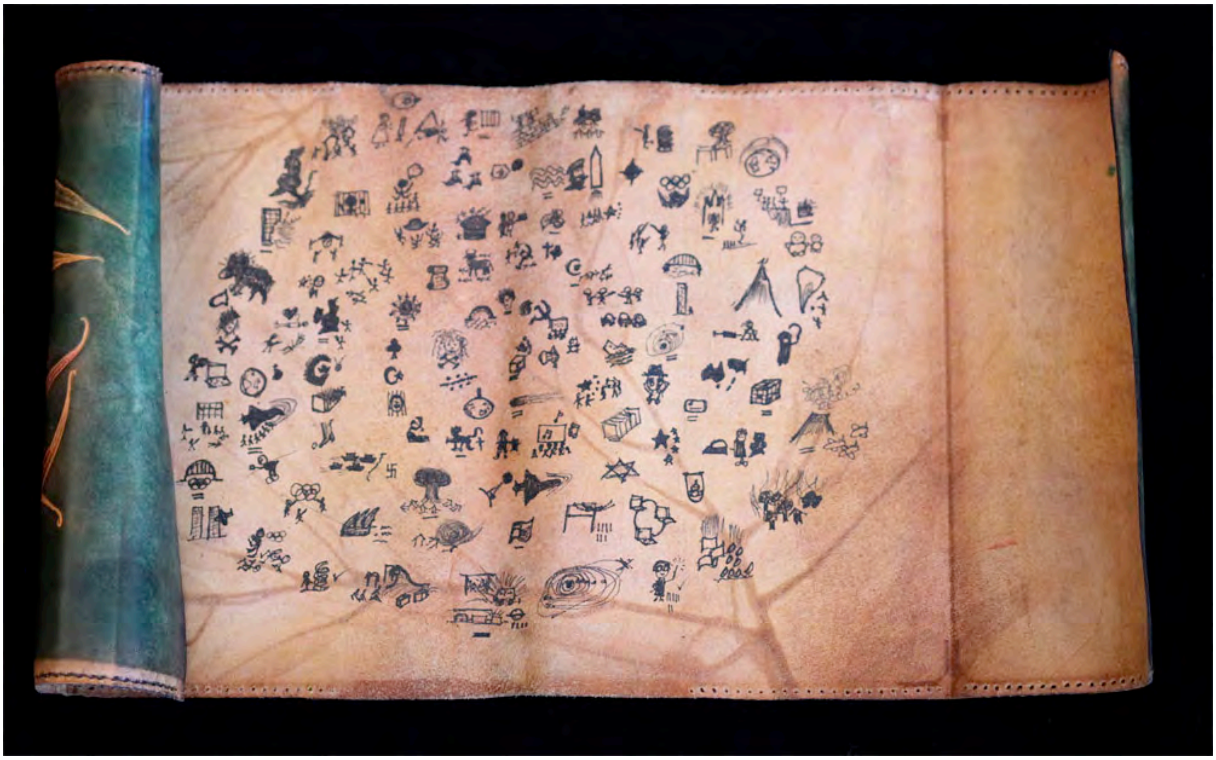

Figure A.6 The 'winter count'.

I have created the leather 'winter count' in the style of the Lakota winter count. The images on the leather start in the centre and spiral outwards, each representing the major event of the year, starting with the Chinese Boxer Rebellion in 1900 and going to the Icelandic volcano eruption in 2010. This memory aid is incredibly effective in aiding memory of key events in chronological order. Further events from the same year, or details of the events, are then woven into stories and imagined vividly to aid memory.

Testing with other people, I have found about 10% (12 or so) of the images link to the intended events for them. However, once told the event while looking at the image, people were soon able to recall almost all of them at a future date, as long as they had the 'winter count' in hand. Without it, they could recall very few.

Significantly, many of the images were misinterpreted which acts as a warning to those attempting to decipher meaning from prehistoric images where no trace of the oral component of the knowledge system remains.

Figurines

As described in Chapter Three, figurines and dancers represent mythological characters in ritual and ceremony, at which time their stories are told. These stories may have a sequence dictated by the ritual cycle, but they also stand alone, such as the Pueblo kachina, as described in Chapter Seven. Instead of a large number of dolls, I initially chose to assign each playing card in a standard deck with a person or character, as discussed in the mnemonics books by Cooke (2008) and Foer (2011). A deck of cards gives me 52 cards, plus the joker, 53 'kachina'. A story is created by linking the characters in the order of the shuffled deck or selected packet of cards. For example, the Queen of Clubs might be permanently associated with Queen Elizabeth II, with the Eight of Spades associated with spiders. Should these two cards arise in the sequence on order, the Queen is imagined encountering spiders. To make the image more memorable, the spiders are huge and the Queens reaction sensational.

I found this task quite difficult to establish. Pueblo cultures give children dolls and start them learning the names and characteristics of each character from a young age. Most, if not all, oral cultures start the education of the young with stories of the key figures in their mythology, be they ancestors, kachina or other forms. Knowledge can then be build on that structure over years. This experiment has taught me why.

I have a collection of dolls and bears with associated characters. I chose then to assign these characters to the cards, grouped as they are within the house, and according to how they are used by myself and granddaughters. This was significantly easier and the associations with cards very quickly established. Although my story lines do not lend themselves to the vulgarities so highly recommended as memorable by Cooke and Foer, the system has worked extraordinarily well. I have concluded that instead of associating characters with cards, it is the characters, the dolls and bears, which are the memory loci, and the cards merely one set of associations. However, the associations with the cards has now firmly sequenced the dolls and bears, much as a ceremonial cycle might do for kachina.

Alphabetic associations

In order to experience the mnemonic methods recommended by the modern memory experts, and associations with non-sequenced locations, one further experiment has been instigated. 30 locations around the town of Castlemaine have linked to the 26 letters of the alphabet, plus Ch, Ph, Sh and Th, to remember people's names. On meeting a person, they are imagined in some action at the location starting with the letter(s) of their name. For example, a man named Robert would be associated with the Restorers' Barn, a haven for those seeking

old or replica house fittings. Robert would be imagined robbing the shop. With a surname of Smith, he would be imagined struggling to steal a forge. Further information about the person can be added to the image building in my memory. Number of children, occupation, hobbies…can all be added in using vivid, preferably grotesque or humorous, associations to make it more memorable.

Conclusions

Because the mnemonic techniques discussed above are visual, and need only be recalled as images, the ability to use them while speaking or performing is far greater than when a logical association is made in order to remember information. I have found that visual associations appear in my thinking independently of my speech and interaction with an audience. Hence the effectiveness of the mnemonic techniques from oral cultures in performance is far greater than I could have understood had I not experienced them myself.

It takes considerable work to commit a great deal of information to memory reliably. Memory is greatly aided by these devices, in particular the set of locations for the Method of Loci, which require no device in hand. Working on these memory methods demonstrated just how much simpler writing can be, and therefore why literacy has, in almost all parts of the world, replaced orality.

All the experiments discussed above are in their infancy and will be on-going.

*Appendix B – Naming the parts of the Saltwater Crocodile (*Crocodylus porosus*).*

Taken from Kelly, L. 2006, *Crocodile: evolution's greatest survivor*, Allen & Unwin, Crows Nest, N.S.W., pp. 25-8. The story is adapted from Margaret Lawrie's *Myths and legends of Torres Strait* (1970, pp. 192-4).

From the Western Province of Papua New Guinea comes a story which tells how the names of the various parts of the crocodile were given. Given the close relationship the many tribes have with the crocodiles which inhabit every waterway, the fact they have such detailed language linked to their legends is no surprise.

There was a small village, not far from the mouth of the Oriomo River, consisting of three families with eleven children. Their totem was the crocodile. Whenever the parents went to work in the gardens, the children would be minded by a very old man, the oldest person in the village. He was very conscientious, never letting the children stray from his sight. There was only one boy, Gaizu. One day, Gaizu's father uncovered a crocodile egg while out hunting. In the rare case of a single crocodile egg being laid, the egg is known to be very special.

Gaizu's father built a special pen for the egg and watched over it carefully. The egg finally hatched in its muddy riverside pen. The tiny crocodile was given to Gaizu as a pet. All the children loved the little crocodile who they named Aka, the word for grandmother, because they loved it as they did their own grandmothers.

It wasn't long before Aka had grown and grown, the children realised she could take them for a ride on her back. They waited eagerly for their parents to go to the gardens and leave them with only the old man to watch them then, for the first time they let Aka out of her pen. They then begged Aka to take them for a ride on the river. Gaizu took up his position at the front of Aka's head, right on the nostrils. Sabui, Kuikit, Kayut-dan and Nataru-kubi sat in order on the head. Nubeza and Za-nubesa sat on her back while Adata, Ulaita and Mopata sat on her tail. The parts of the crocodile are known by those names today.

Aka took them down to the mouth of the river and, when the tide turned, she brought them back to the village. No-one knew of their adventures except the old man who could not stop them. Many times, when their parents were away, the children rode the crocodile to the mouth of the river and home again. When their parents finally learned of the journeys, they

were unable to stop the children.

One day, Aka swam beyond the mouth of the river and out to sea where she fed on seaweed and grass. When they returned home, Gaizu was very cross with her. He demanded she open her mouth, took the seaweed and grass from her throat, and having shown her the remains, he then threw them in her face. The old man rebuked him, for he knew that the crocodile would become bad tempered.

Each time they returned, Gaizu would take the seaweed and grass from Aka's mouth and throw it at her. The old man became more worried. Eventually, Aka became so angry she took the children far out to sea, where she lowered her body down in the water. The children begged her to stop, for they were getting wet, but she took no notice. Aka called all the crocodiles and sharks in the sea to join her, then she started to swim. She swam and swam, further and further from their village. The children begged her to take them home but she still took no notice.

The old man watched from the top of a mangrove tree, knowing they would never return. When Aka had swum past the island of Bobo, Gaizu called to her to stop at the reef he could see ahead. But the foam was not a reef. It was the sharks and crocodiles Aka had called. With a splash so huge the old man could see it from his far-off mangrove tree, Aka tossed the children into the water, into the mouths of her waiting friends. They were all eaten.

The old man told the parents all that had happened. They faced the island of Bobo and wept for their lost children. Aka was never seen again.

The crocodile which swims from the rivers into the sea, and eats people, is the saltwater crocodile.

Appendix C – Mayan Calendar Round mathematics

During pre-Columbian times, Mesoamerica civilisations kept an intricate calendar interweaving the solar annual cycle used for civil purposes, with a constructed sacred cycle. The two cycles combine to produce what is known as the 'Calendar Round'. Details of this calendar were retained orally by the Highland Maya (Tedlock 1992, p. 1). Barbara Tedlock trained with the Highland Maya in daykeeping, as described in Chapter Five. Data for this Appendix is from her detailed account of that training (Tedlock 1992).

The solar calendar consisted of a 365-day cycle of 18 months, each consisting of 20 days. This left five remaining days. The sacred calendar consisted a succession of day designations created by counting from 1 to 13 repeatedly through a constant repetition of a list of 20 names. As 20 cannot be divided evenly by 13, it will take 20 cycles before the same number is assigned to the same name again. This process therefore creates 260 different combinations of number and name, as shown in Figure App.C.1. The first, and 261st days are both *1-Ik'*, while that combination does not occur at any time between.

1	1-Ik'
2	2-Ak'abal
3	3-C'at
4	4-Can
5	5-Came
6	6-Quej
7	7-K'anil
8	8-Toj
9	9-Tz'i'
10	10-Batz'
11	11-E
12	12-Aj
13	13-Ix
14	1-Tz'iquin
15	2-Ajmac
16	3-No'j
17	4-Tijax
18	5-Cawuk
19	6-Junajpu
20	7-Imöx
21	8-Ik'
22	9-Ak'abal
23	10-C'at
24	11-Can
25	12-Came
26	13-Quej
27	1-K'anil

28	2-Toj
29	3-Tz'i'
30	4-Batz'
31	5-E
32	6-Aj
33	7-Ix
34	8-Tz'iquin
35	9-Ajmac
36	10-No'j
37	11-Tijax
38	12-Cawuk
39	13-Junajpu
40	1-Imöx
41	2-Ik'
42	3-Ak'abal
43	4-C'at
44	5-Can
45	6-Came
46	7-Quej
47	8-K'anil
48	9-Toj
49	10-Tz'i'
50	11-Batz'
51	12-E
52	13-Aj
53	1-Ix
54	2-Tz'iquin

55	3-Ajmac
56	4-No'j
57	5-Tijax
58	6-Cawuk
59	7-Junajpu
60	8-Imöx
61	9-Ik'
62	10-Ak'abal
63	11-C'at
64	12-Can
65	13-Came
66	1-Quej
67	2-K'anil
68	3-Toj
69	4-Tz'i'
70	5-Batz'
71	6-E
72	7-Aj
73	8-Ix
74	9-Tz'iquin
75	10-Ajmac
76	11-No'j
77	12-Tijax
78	13-Cawuk
79	1-Junajpu
80	2-Imöx
81	3-Ik'

82	4-Ak'abal
83	5-C'at
84	6-Can
85	7-Came
86	8-Quej
87	9-K'anil
88	10-Toj
89	11-Tz'i'
90	12-Batz'
91	13-E
92	1-Aj
93	2-Ix
94	3-Tz'iquin
95	4-Ajmac
96	5-No'j
97	6-Tijax
98	7-Cawuk
99	8-Junajpu
100	9-Imöx
101	10-Ik'
102	11-Ak'abal
103	12-C'at
104	13-Can
105	1-Came
106	2-Quej
107	3-K'anil
108	4-Toj

109	5-Tz'i'
110	6-Batz'
111	7-E
112	8-Aj
113	9-Ix
114	10-Tz'iquin
115	11-Ajmac
116	12-No'j
117	13-Tijax
118	1-Cawuk
119	2-Junajpu
120	3-Imöx
121	4-Ik'
122	5-Ak'abal
123	6-C'at
124	7-Can
125	8-Came
126	9-Quej
127	10-K'anil
128	11-Toj
129	12-Tz'i'
130	13-Batz'
131	1-E
132	2-Aj
133	3-Ix
134	4-Tz'iquin
135	5-Ajmac
136	6-No'j
137	7-Tijax
138	8-Cawuk
139	9-Junajpu
140	10-Imöx
141	11-Ik'
142	12-Ak'abal
143	13-C'at
144	1-Can
145	2-Came
146	3-Quej
147	4-K'anil
148	5-Toj
149	6-Tz'i'
150	7-Batz'
151	8-E
152	9-Aj
153	10-Ix
154	11-Tz'iquin
155	12-Ajmac
156	13-No'j
157	1-Tijax
158	2-Cawuk

159	3-Junajpu
160	4-Imöx
161	5-Ik'
162	6-Ak'abal
163	7-C'at
164	8-Can
165	9-Came
166	10-Quej
167	11-K'anil
168	12-Toj
169	13-Tz'i'
170	1-Batz'
171	2-E
172	3-Aj
173	4-Ix
174	5-Tz'iquin
175	6-Ajmac
176	7-No'j
177	8-Tijax
178	9-Cawuk
179	10-Junajpu
180	11-Imöx
181	12-Ik'
182	13-Ak'abal
183	1-C'at
184	2-Can
185	3-Came
186	4-Quej
187	5-K'anil
188	6-Toj
189	7-Tz'i'
190	8-Batz'
191	9-E
192	10-Aj
193	11-Ix
194	12-Tz'iquin
195	13-Ajmac
196	1-No'j
197	2-Tijax
198	3-Cawuk
199	4-Junajpu
200	5-Imöx
201	6-Ik'
202	7-Ak'abal
203	8-C'at
204	9-Can
205	10-Came
206	11-Quej
207	12-K'anil
208	13-Toj

209	1-Tz'i'
210	2-Batz'
211	3-E
212	4-Aj
213	5-Ix
214	6-Tz'iquin
215	7-Ajmac
216	8-No'j
217	9-Tijax
218	10-Cawuk
219	11-Junajpu
220	12-Imöx
221	13-Ik'
222	1-Ak'abal
223	2-C'at
224	3-Can
225	4-Came
226	5-Quej
227	6-K'anil
228	7-Toj
229	8-Tz'i'
230	9-Batz'
231	10-E
232	11-Aj
233	12-Ix
234	13-Tz'iquin
235	1-Ajmac
236	2-No'j
237	3-Tijax
238	4-Cawuk
239	5-Junajpu
240	6-Imöx
241	7-Ik'
242	8-Ak'abal
243	9-C'at
244	10-Can
245	11-Came
246	12-Quej
247	13-K'anil
248	1-Toj
249	2-Tz'i'
250	3-Batz'
251	4-E
252	5-Aj
253	6-Ix
254	7-Tz'iquin
255	8-Ajmac
256	9-No'j
257	10-Tijax
258	11-Cawuk

259	12-Junajpu
260	13-Imöx

The next day in the cycle is 1-Ik’

Figure App.C.1 The 260 number / name combinations for the sacred Calendar Round.

The Mayan Calendar Round is then created by meshing the two cycles, one of 365 days and the other 260 days. Although it sounds confusing to have any given day designated by two different systems, these in fact cause no conflict because actions depend on whether the activity is dictated by the sacred or the civil calendar.

The Highland Maya who trained Tedlock laughed at her when she asked what the first day was, and told her there was no first day (Tedlock 1992, p. 97). As described in Chapter Five, many indigenous cultures think in terms of cycles, not linear time scans with a start and finish. Hence the table given in Figure App.C.1 is a literate concept rather than an indigenous one.

The first day of the month on the solar calendar is called the *Mam* in Highland Mayan languages, which is often translated as “Year-bearer”. It can only occur on 52 (4 x 13) possible days from the 260 day sacred calendar. This can best be understood by considering one 365-day cycle. There are 28 complete cycles of the 13 numbers from the sacred calendar. As 13 x 28 gives 364, there is one extra day in the solar cycle of 365 days. If the year we are considering started with a day in the sacred calendar associated with the number 1, as shown in Figure App.C.1, then the following solar year will start with a day associated with the number 2. It will take 13 years to start the solar year with a day in the sacred cycle associated with the number 1 again.

When considering the names associated with the days, there are 20 different day names in the sacred calendar. The solar year can therefore accommodate these 20 days names rotating 18 times. 18 x 20 = 360. This leaves 5 days over in the 365 day solar year. Consequently, the name of the day which starts the solar year will advance by 5 day names in the sequence each year. As 5 divides evenly into the 20 possible day names, this means that only 4 of these names will ever appear as a starting day name for the solar calendar.

Appendix D – Acoustic effects and ray traces for henge ditches and banks

This thesis proposes that the flat-bottomed segments of the ditches surrounding the Neolithic henges acted as a series of performance locations, as described in Chapter Eleven. Without computer modelling, or even better the digging of massive ditches for experiments, it is impossible to demonstrate the possible wave effects nor evaluate their impact. I was unable to find any analysis of ditch acoustics, which is not surprising as ditches are not usually considered as performance sites. Drawing on my engineering and physics teaching background, I sketched some simplified ray traces in order to explore the possible effects. I discussed these ray traces with acoustic engineer, Pam Clements, over a number of conversations in 2009. Much of the discussion drew on Clements' knowledge of the acoustics of orchestra pits, the nearest we could come to topologically similar spaces, that is a space enclosed on all sides but with no roof, and which were similar in scale to the Neolithic henge ditches. We concluded that a number of effects would come into play, including the direct transmission of sound to the listener if in direct line, as well as sound reflected from the banks of the ditch leading to reverberation, resonance, and interference. In particular, Clements emphasised that the apparent source of the sound would be from within the earth rather than from the ditch. These discussions led to the analysis given below.

It is beyond the scope of this thesis to provide a detailed analysis of the theoretical acoustics, especially when the details of the ditch dimensions are so difficult to find, or simply not available. Hence the discussions and diagrams below just indicate some initial thinking about possible acoustic enhancement and indicate that the observations described in Chapter Eleven for passage cairns, caves and standing stones[30] may also apply to the ditches. It is not in any way here implied that Neolithic engineers designed these ditches using acoustic analysis. Everything suggested here can be understood purely from observation and experimentation. The discussion below can only be considered an intriguing starting point, an indication that acoustic analysis of the ditches at Neolithic henges is well worth pursuing. Clearly this approach can only be properly explored through computer modelling and/or experimental archaeology.

Many people experience acoustic enhancement by singing in the shower. The hard wall surfaces and lack of soft furnishings create an acoustic environment which is pleasing to the human ear. The multiple reflections from the walls within a fairly small dimensional space

[30] See Crewdson & Watson 2009; Devereux 2006; Till 2009; Watson & Keating 1999; Watson & Keating 2000; Watson 2001a; Watson 2006.

produce various kinds of standing waves, reverberation and echoes. As will be shown below, these effects are also to be expected in a ditch segment cut into chalk. It is reasonable to assume that some acoustic enhancement was noticed in the shallow ditches, such as at Stonehenge, probably built for protection from bad weather rather than acoustic enhancement. The imperative would always be to perform the ceremonies, no matter what the weather.

Given the ditches were constructed in stone, the reflection of the sound waves would be much greater than in materials such as earth which has a much higher absorption coefficient. These effects would be enhanced by digging the much deeper ditches for larger gathering sites such as Durrington Walls, Avebury and the Ring of Brodgar. In particular, resonance effects would be apparent. Resonance is the tendency for sound to oscillate at a greater amplitude, that is louder, at some frequencies than at others. At these resonance frequencies, even small vibrations within the system can lead to large amplitude oscillations. In the case of the ditches, resonance will be due to vibrations established in the chalk surfaces. There are usually a number of resonance frequencies because the harmonics of a primary frequency will also be resonance frequencies.

While considering the dimensions of the Durrington Walls ditch and bank, it became apparent that a ditch segment was of roughly similar dimensions to a medium-sized university lecture theatre, but without a roof. The nearest example of acoustic analysis I could find was a study of an ancient Greek theatre by Farnetani, Prodi and Pompoli (2008) which looks at acoustic effects such as reverberation, sound clarity and sound strength. Reverberation is created when sound is produced in an enclosed space so that the sound echoes often and then slowly decays as it is absorbed by the walls and air. Reverberation is perceived as the persistence of sound after it has been produced, slowly fading rather than instantly lost. In terms of the chalk ditches, the walls would be far less absorbent than earth, wood or other softer materials. The image of the ditch excavation at Avebury (see Figure 11.16) indicates that the reverberation effects would be even more pronounced due to a greater depth to width ratio than for the ditch at Durrington Walls, based on the few available figures for the cross section of the Durrington Walls ditch. In the narrower, deeper ditch, the reflected waves would be retained within the space for many more reflections.

Further to this, the diffraction effects examined by Declercq and Dekeyser (2007) demonstrated that the superb acoustics at the Hellenistic amphitheatre of Epidaurus was in part due to the diffraction caused by the material used for seating, in this case limestone. Diffraction is the apparent bending of waves around obstacles and the spreading out of waves travelling past small openings. As the dimensions of the Durrington Walls ditch segments appear to have been within the same order of magnitude as the Hellenistic amphitheatre, and chalk would have similar acoustic properties to limestone, it is reasonable to hypothesise that

the acoustic effects so widely admired in the ancient Greek theatres may have been, to a much lesser extent, apparent to the builders of Durrington Walls and Avebury.

The ray traced diagrams presented below give a few examples of the way in which sound effects would have been generated by performance in the bottom of ditches at Stonehenge and at Durrington Walls. Diagrams 1 and 2 in Figures App-D.1 and App-D.2 show how the sound waves are reflected giving the effect of a remote source, the impact which Clements indicated would be the most apparent. As the human brain assumes that sound has travelled in a straight line from the source to the ear, sound will be perceived as coming from the locations indicated, that is, from within the earth. For some directions, no direct sound will reach the listener who will hear all sound as coming from some location other than the ditch. Sounds perceived as emanating from the earth were noted in experiments on the passage cairns (Watson & Keating 1999, p. 330). The impact of this effect would increase significantly with the depth of the ditch, as can be seen by comparing the perceived sources for Stonehenge and Durrington Walls.

All diagrams, except Diagram 1 for Durrington Walls, show rays labelled A and B impacting on the listener. This is to demonstrate that at least two sound paths can be found for a single sound source. The waves from these two paths will then interfere with each other. Interference is caused by the interaction of two sound waves which are coherent, that is of the same frequency, in this case because the waves come from the same voice or instrument. This effect will only occur under certain constrained conditions. Waves A and B superimpose to form a resultant wave which varies in amplitude, that is becomes louder or softer at different locations depending on whether the interfering waves are adding or opposing. In certain situations, these will lead to standing wave patterns, where the volume variations are stationary and can be moved through by participants. Such intensity variations and standing wave patterns have been observed in acoustic experiments in Neolithic monuments (Watson & Keating 1999).

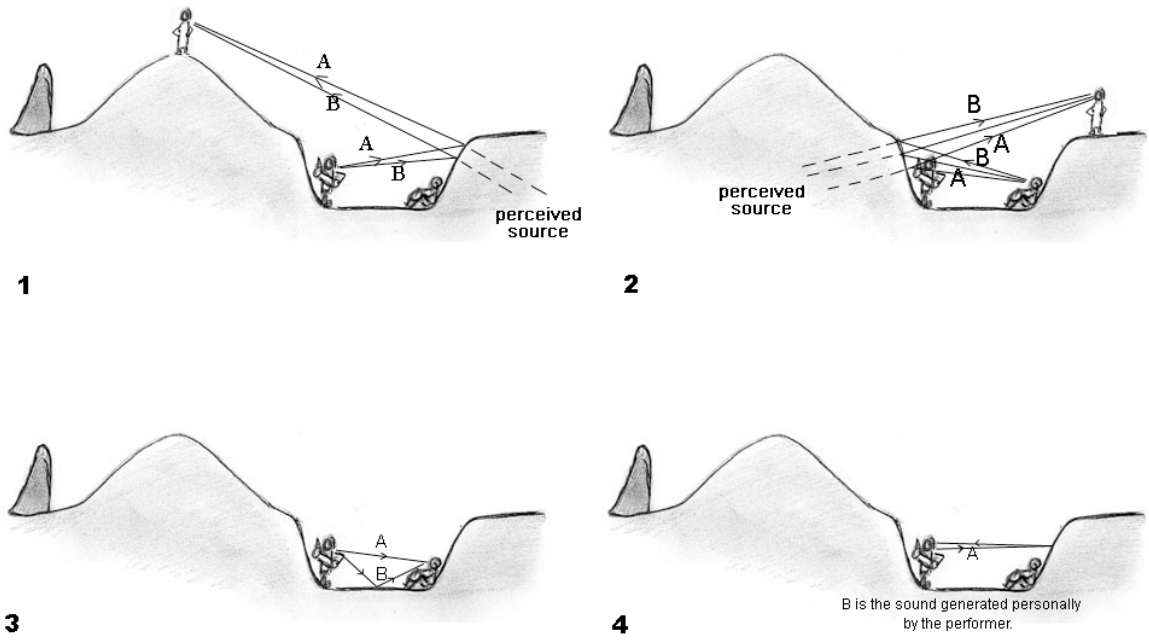

Figure App-D.1 Simplified examples of ray traces for the Stonehenge Ditch. (1) interference and perceived source for person on bank (2) interference and perceived source for person outside the circle (3) interference effects for fellow performer (4) interference effects for performer. Drawing: Lynne Kelly.

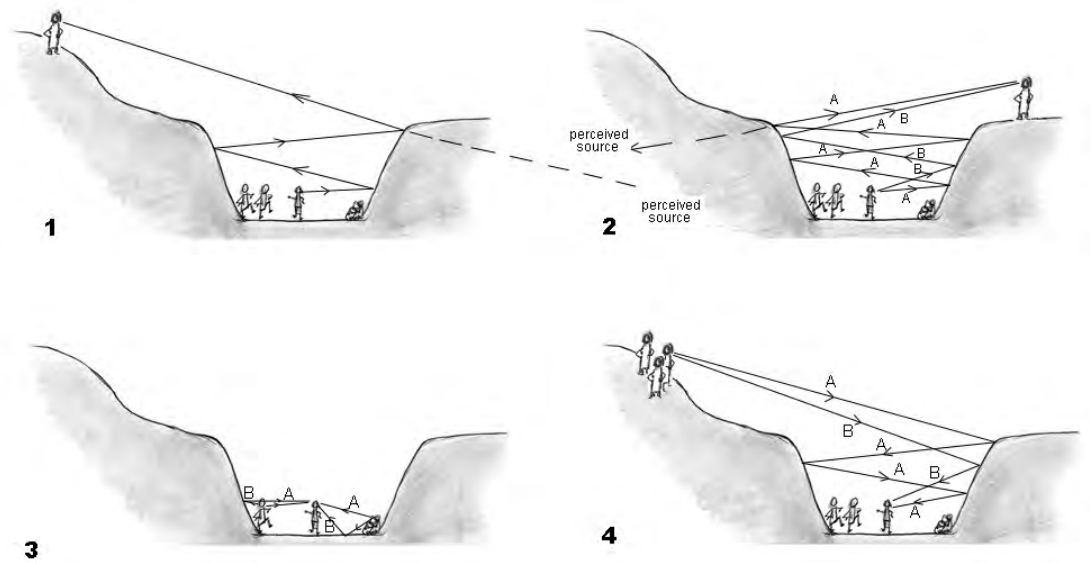

Figure App-D.2 Simplified examples of ray traces for Durrington Walls ditch showing the potential for greatly increased acoustic effects than for Stonehenge, especially the possibility of substantial resonance. (1) perceived source for person on bank (interference would be as in diagram 2) (2) perceived source and interference for person inside circle (3) interference effects from other performers (4) performers in ditch detecting interference effects from chanting on bank. Drawing: Lynne Kelly.

Appendix E - A brief overview of the archaeology of Great Zimbabwe

Great Zimbabwe was built on the southern scarp of the high plateaux between the Zambezi and Limpopo rivers (Garfield 1973, p.15) in what is now Zimbabwe. It is characterised by massive, irregular curved stone walls, built without mortar, which created unroofed enclosures (Garfield 1973, p. 17). The enclosed buildings have been interpreted as dwellings (Garfield 1973, p. 19). Garfield writes that 'Great Zimbabwe was clearly a residential site. Enormous middens of household rubbish have accumulated outside almost every enclosure and down the slopes of the Hill' (1973, p. 111).

Archaeological reports from Great Zimbabwe are impoverished due to the plundering and poor recording during early colonial presence when archaeological interpretation argued for non-indigenous origins so that exploitation of the indigenous population would not be impacted (Garfield 1973, Chirikure & Pikirayi 2008). These writers also constantly refer to the ruler and the elite families within the enclosures, and the ordinary population outside. Chirikure and Pikirayi conclude that 'Great Zimbabwe emerged from local farming communities as a series of aristocratic centres succeeding each other in a manner consistent with Shona systems of political succession and chiefly politics (2008, p. 991).

Although most of the ten indicators for a knowledge elite are missing, it is not surprising to find that there are structures which could serve as an indexed set of mnemonic objects to aid memory of the oral tradition as Great Zimbabwe was an oral culture. Garfield writes that 'Upright stone monoliths were not only placed in the bastions but were frequent elsewhere, set upright in the ground, grouped on low moulded daga platforms or set along the tops of the largest external walls. Some stood 14 ft high and several of the soapstone examples were decorated with incised geometric patterns' (Garfield 1973, p. 25). The monoliths 'were particularly abundant in the area in front of the enigmatic elliptical tower, on a platform next to it and along the wall behind' (Garfield 1973, p. 121). The platforms as described in Garfield (1973, p. 25, 29) are not mentioned as performance platforms but more as stands for the monoliths. Performance sites were not mentioned in either Garfield or Chirikure and Pikirayi (2008). Garfield writes that

> Most monoliths were rough slabs of natural granite or soapstone, and some of the latter were covered with bands of incised geometric patterns using simple motifs like the hatched diamond, hatched triangle and chevron.
>
> These monoliths clearly had no utilitarian purpose and the arrangements of many of

> them in compact groups was scarcely decorative. Further, their distribution appears to have been ordered and not haphazard; they were concentrated in areas that on other evidence seemed to have had a sacred character (1973, p. 122).

Seven carved soapstone birds, about 35 centimetres high, were mounted on monoliths about a metre tall. The birds do not appear to represent any specific species, each being individual carvings (Garfield 1973, p. 119-121; Chirikure & Pikirayi 2008, p. 987). It seems likely that, in the light of the discussion on mnemonic technologies in Chapter Three, that these monoliths were perfectly placed to serve the utilitarian purpose of acting as an ordered set of memory aids to the knowledge system. Further enigmatic objects have been found, such as 'highly abstract anthropomorphic figurines' (Garfield 1973, p. 123), over one hundred phalli (Garfield 1973, p. 123) and flat dishes with abstract patterns or animals around the outside (Garfield 1973, p. 67)

Great Zimbabwe was a trading centre where material goods were identified as trade items. It was the dominant economic and trading post in the central African interior during the fourteenth and fifteenth centuries (Garfield 1973, p. 129). Iron and other metal working was evident in large quantities with trade indicated with international trading contacts along with direct contact with the coastal cities (Garfield 1973, p. 133; Chirikure & Pikirayi 2008, p. 986). Imported artefacts constitute a significant part of the material culture recovered at Great Zimbabwe (Chirikure & Pikirayi 2008, p. 988).

Although some astronomical alignments have been suggested for Great Zimbabwe, the hypothesis is at best speculative and the evidence limited (Clark & Carrington 2002).

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